

NAME: Pratt & Whitney
I.D. NO.: CTD990672081
FILE LOC: R-113
OTHER: RDMS # 2448

RCRA PART B APPLICATION
UNITED TECHNOLOGIES CORPORATION
PRATT & WHITNEY
400 MAIN STREET
EAST HARTFORD, CONNECTICUT 06108
EPA I.D. No. CTD990672081

SUBMITTED TO

CONNECTICUT DEPARTMENT OF
ENVIRONMENTAL PROTECTION
HARTFORD, CONNECTICUT

ENVIRONMENTAL PROTECTION
AGENCY — REGION 1
BOSTON, MASSACHUSETTS



400 Main Street
East Hartford, Connecticut 06108

Group Operations

November 26, 1985

NAME: Pratt & Whitney
I.D. NO.: CTD990672081
FILE LOC: R-1B
OTHER: _____

Mr. George Dews
Senior Sanitary Engineer
Hazardous Waste Management Unit
Department of Environmental Protection
165 Capitol Avenue
Hartford CT 06106

REFERENCE: RCRA Part B Application
Pratt and Whitney, East Hartford
EPA ID No. CTD990672081


Dear Mr. Dews:

Enclosed please find two copies of the revised pages to the subject permit application prepared in response to the Notice of Deficiency we received October 21, 1985. This material does not respond to your concerns on the incinerator portions of the application, as we have decided to proceed with proper closure of the incinerator. We will soon be submitting a closure plan to your attention which will cover only this unit.

Please replace the appropriate pages in the previous Part B Application dated March 22, 1985 with these revisions. If you have any questions concerning any of the above, please contact Kevin Vidmar at 565-2016.

Thank you for your courtesy and cooperation.

Very truly yours,


John W. Casey
Group Assistant Counsel

JWC/KPV/tc

Attached

cc: Andrew Hoffman - EPA

RCRA PART B APPLICATION
UNITED TECHNOLOGIES
PRATT & WHITNEY AIRCRAFT
400 MAIN STREET
EAST HARTFORD, CONNECTICUT 06108

EPA I.D. # CTD990672081

March 22, 1985

NAME: Pratt & Whitney
I.D. NO: CTD990672081
FILE LOC: R-113
OTHER: _____

Submitted To:

Connecticut Department
of Environmental Protection
Hartford, CT

Environmental Protection Agency
Region I
Boston, MA

TABLE OF CONTENTS

1 thru 2

Part I - General Information Requirements	<u>3</u> thru <u>112</u>
Section A - General Facility Description	<u>3</u> thru <u>8</u>
Section B - Waste Descriptions and Analysis	<u>9</u> thru <u>23</u>
Section C - Waste Analysis Plan	<u>24</u> thru <u>27</u>
Section D - Security Procedures and Equipment	<u>28</u> thru <u>28</u>
Section E - General Inspection Schedule	<u>29</u> thru <u>37</u>
Section F - General Contingency Plan	<u>38</u> thru <u>58</u>
Section G - General HWF Procedures	<u>59</u> thru <u>61</u>
Section H - Facility Location Information	<u>62</u> thru <u>63</u>
Section I - Personnel Training	<u>64</u> thru <u>68</u>
Section J - Closure Plan and Cost Estimate	<u>69</u> thru <u>86</u>
Section K - Topographic Map	<u>87</u> thru <u>89</u>
Section L - Financial Assurance and Liability Insurance	<u>90</u> thru <u>113</u>

TABLE OF CONTENTS (Cont'd)	<u>2</u> thru <u>2</u>
PART II - Specific Information Requirements	<u>114</u> thru <u>151</u>
Section M - Storage of Containers	<u>115</u> thru <u>131</u>
Section N - Treatment and Storage Tanks	<u>132</u> thru <u>135</u>
Section O - Liquid Injection Incinerator This section removed but page numbering has remained to keep document numbering consistent.	<u>136</u> thru <u>151</u>
TABLE OF ACRONYMS	<u>151</u> thru <u>152</u>
TABLE OF EXHIBITS	<u>153</u> thru <u>153</u>
EXHIBITS	<u>154</u> thru <u>211</u>
CERTIFICATION	<u>212</u> thru <u>212</u>
APPENDICES	
Appendix I - RCRA Part A Application	
Appendix II - United Technologies 1984 Annual Report	
Appendix III - Facility 1983 Biennial Hazardous Waste Report	

SECTION - A - GENERAL FACILITY DESCRIPTION

Pratt & Whitney (P&W) is the major Group in the Power Sector of United Technologies Corporation. P&W has a large complex in East Hartford, Connecticut, which includes three sites as defined by the Resource Conservation and Recovery Act (RCRA) regulations. The mailing address for the complex is:

Pratt & Whitney
400 Main Street
East Hartford, Connecticut 06108

The facility locations for the three RCRA sites are as follows:

<u>Street Address</u>	<u>EPA ID #</u>
400 Main Street	CTD 990672081
Colt Street	CTD 000844399
Pent Road	CTD 000845131

The Main Street site designs, manufactures, assembles, and tests aircraft jet engines and engine components. The Pent Road site develops and tests aircraft jet engines and engine components. The Colt Street site is used exclusively as a dilute industrial wastewater treatment facility and is permitted under the National Pollutant Discharge Elimination System (NPDES). This Part B application concerns only the Main Street Site.

General Facility Description (Cont'd)

The manufacturing and developing of jet engines is a high technology industry often using "state of the art" materials and processes. Hazardous wastes are generated at this site by fabricating, cleaning, finishing, coating, testing and research operations.

The hazardous wastes generated at this site are typically water solutions, both concentrated and dilute, containing acids, alkalies, and heavy metals. There are also spent solvents and associated still bottoms generated from production operations and reclamation operations.

Hazardous wastes are also received at the East Hartford complex from other Pratt & Whitney sites. These wastes are also concentrated waste water solutions and spent solvents. All the wastes received at East Hartford are similar or identical to those generated at East Hartford. These off site wastes are often combined with similar on-site wastes for storage.

Hazardous waste activities at this site are reclamation, transportation, storage and treatment. Reclamation is the distillation of spent listed solvents which are primarily generated on-site. P&W has a Hazardous Waste Management Permit (CT-HW-264) issued by the Connecticut Department of Environmental Protection for transportation of hazardous waste. P&W transportation of hazardous wastes occurs only between P&W facilities although licensed waste haulers may also be used. Storage occurs for both on-site and off-site material while awaiting treatment or shipment of licensed waste disposal facilities. Treatment occurs by processing waste water solution in our NPDES facility.

This application is being prepared for submission to both the U.S. Environmental Protection Agency (EPA) and the Connecticut Department of Environmental Protection (DEP). Currently the DEP has been delegated Phase II authority and expects to receive final authorization early in 1986. Although both EPA and DEP regulations are substantially equal

General Facility Description (Cont'd)

there are a few differences in the scope of activities covered in the permitting program. The EPA excludes elementary neutralization or wastewater treatment units under 40 CFR 264.1(g)(6) and 40 CFR 122.21 (d)(2)(vi) for all treatment and most storage tanks at this site. The DEP however requires that all storage tanks which receive off site wastes be included in the application. See Table A-1 for a list of storage tanks at this site and the applicable regulatory program(s). Also included in this application are a storage building and a transporter storage pad.

P&W filed a "Notification of Hazardous Waste Activity", dated August 13, 1980 and "RCRA Part A Application" dated November 18, 1980. The Part A application was later amended by a submittal, dated November 19, 1981, to include a rotary kiln incinerator with the required justification. The rotary kiln incinerator is no longer scheduled to burn any hazardous waste and has not been included in this application.

The Part A has again been revised to remove the excluded treatment tanks and the rotary kiln incinerator for the reasons discussed in the preceding paragraphs and is in Appendix I.

The Part A which accompanies this application contains a liquid injection incinerator. However, this incinerator has never functioned properly and has never been fully operational. The decision has been made to proceed with the proper closure of the incinerator at this time. It is for this reason the incinerator has been removed from the Part B Permit Application. The Part A application will be revised, removing this liquid injection incinerator, once closure has been certified complete.

The solvent reclamation operation at this site includes the distillation of tetrachloroethylene and 1,1,1-trichloroethane. These spent solvents are generated primarily from degreasing operations on site.

HAZARDOUS WASTE STORAGE TANKS

<u>Tank Identification</u>	<u>No. Of Tanks</u>	<u>Capacity (gallons) (each)</u>	<u>EPA H. W. Nos.</u>	<u>Excluded by EPA</u>
Waste Cyanide Solution	1	2,800	F007, F008, F009	No
	1	4,000	F007, F008 F009	No
Waste Alkali Solution	1	4,000	D002	Yes
Waste Chromium Solution	1	4,000	D002 D007	Yes
Waste Acid Solution	1	2,000	D002	Yes
	1	4,000	D002	Yes
Waste Solvent	1	4,000	F001, F002	No
Wax/Solvent	1	2,500	F001, F002	No

Table A-1

General Facility Description (Cont'd)

Approximately 10% of the solvent reclaimed at the East Hartford complex comes from off site P&W Facilities in Rocky Hill and Southington, Connecticut. The distillation process reclaimed approximately 110,000 gallons of solvent during 1982.

On-site solvents for reclaim are collected in containers at the generating locations based on a preventive maintenance schedule and transported to the reclaim area. There the solvents are transported into one of two still feed tanks depending on solvent type. The perchloroethylene feed tank holds 800 gallons and the 1,1,1 trichloroethane feed tank holds 800 gallons. The solvents are distilled with the clean solvent going to receiving tanks which are piped to bulk storage tanks. The still bottoms are sent to the waste treatment area for storage and incineration. On occasion the portable containers used to transport the waste solvents are connected directly to a distillation unit. In addition a third distillation unit was ordered and was delivered during April 1983. This unit reclaims additional solvent from the still bottoms generated by the other two units.

Off-site waste is received in containers and brought to the reclaim area where they are either transferred into one of the feed tanks or piped directly to one of the distillation units. If the off-site waste cannot be immediately processed it is transported to the hazardous waste storage area. The waste is returned to the reclaim area for distillation as soon as practical but usually within one week.

The solvent reclaim area is located inside the factory building on a wood block floor underlain by concrete. Any spills occurring in this area would be contained.

General Facility Description (Cont'd)

There is no storage of hazardous wastes occurring in the reclaim area since the feed tanks are part of the reclamation systems. Therefore, none of the activities in the reclaim area come under the scope of this permit application.

SECTION - B - WASTE DESCRIPTIONS AND ANALYSES

I The Hazardous Waste Streams handled at the Pratt & Whitney Facility are identified through one or more of several methods:

A) Process information - P&W Process Solution (PS) information is published and describes the material used in making the solutions used in the factory. This make-up material is further identified by Process Material Control (PMC) or Pratt & Whitney (P&W) numbers, which identify individual components of the approximately 400 solutions, descriptions and supporting material specifications of which are contained in volumes of literature located near the treatment areas. The Process Solutions used at P&W are made up to exacting specifications from virgin material (acids, alkalies, chromium compounds, cyanides, etc.) and are analyzed constantly while in use by a P&W Material Control Laboratory (MCL).

Solutions are discarded for various reasons. Acid solutions may be discarded if they become too dilute and parts of solutions are discarded if they are too strong. Most other solutions are discarded when it is decided by the operating departments that the solutions can no longer adequately perform their designed function. Alkali cleaning solutions must be discarded when they contain too much oil and grease. Cyanide solutions are discarded when they are contaminated with oil and grease along with metals. Chromium solutions are usually discarded because of aluminum contamination. In all cases, the original constituents

of the solutions and not the contamination cause the solutions to become hazardous waste. The discarded solution has the same characteristics of the original solution, but with decreased strength, and in the case of chemical milling or stripping solutions, there is metal contamination from the part being worked. Each different solution is numbered and the compositions of these solutions do not change.

- B) Manufacturer's information - Data obtained from material manufacturers includes material specifications, material safety data sheets, and if necessary, specific written information direct from the manufacturer.
- C) Laboratory Analysis - Required laboratory analysis is performed by an independent licensed laboratory, or by one of two P&W laboratories, the Material Control Lab (MCL) or the Material Engineering Research Lab (MERL). The MCL routinely analyzes new material being introduced into the plant and material being used in the production process.

II Waste Delivery

- A) When a waste is generated in a department of P&W, the department supervisor (usually a foreman) completes a P&W Internal Waste Manifest card (Exhibit E), providing generator and department information, identification of the waste material and packaging information. The generator then calls the Plant Engineering Operations Department Concentrated Waste Treatment Plant (CWTP) requesting that the waste be picked up.
- B) The Plant Engineering Operations Department CWTP operators are dispatched to the generating department to pick up the waste. They inspect the waste, review the internal waste manifest and sign it, thereby accepting the waste.

If a CWTP operator believes the waste does not meet the description on the Internal Waste Manifest, he can refuse the waste and insist that the generator provide further analysis, or he can accept the waste and request that it be analyzed by the Operations Department as described in the Waste Analysis Plan, Section C. Every container of waste received by the Operations Department is opened and inspected by a CWTP operator who then signifies acceptance of the waste by signing the appropriate section of the waste manifest. Once a waste has been accepted it is put into the appropriate storage location, and its data is entered into the permanent computer record keeping system.

- C) Waste is also received at the CWTP from branch plants. Before a waste is shipped from a branch plant, a responsible member of the branch's Plant Engineering Department will call the CWTP Industrial Waste Analyst and describe the material. If the description provides adequate information the branch will be given permission to

ship the waste, otherwise additional informational analysis will be requested. When it arrives at East Hartford, the waste will be inspected to see that it meets the description provided on the P&W Internal Waste Manifest and the Hazardous Waste Manifest (if required). At this point the operator will accept the waste and place it in storage, but he may request additional information about the waste from the branch plant before the waste is disposed.

III Waste Descriptions

A) Table B-1 provides one example for each general waste type, stating the solutions original composition as found in the Process Solutions manual. As previously mentioned, the composition of a waste solution will be essentially the same as the original Process Solution. Information such as this is available for each of the hazardous wastes mentioned below. Annual volumes for each waste are available in the 1983 Facility Biennial Hazardous Waste Report presented in Appendix III.

B) Acids

1) P&W uses several acids in its production processes. The resulting acid wastes are spent acid-water solutions of varying concentrations. Acid wastes are treated by neutralization, after which the neutralized solution flows to a final treatment plant for metal removal.

CONFIDENTIAL BUSINESS INFORMATION

RCRA Part B Permit Application
United Technologies
Pratt & Whitney
CTD 990672081

Page 13 of 212
March 22, 1985

TABLE B-1
PROCESS SOLUTION EXAMPLES

AVAILABLE ON 21ST FLOOR

3-28-85

HH

CONFIDENTIAL BUSINESS INFORMATION

2) Types of Acids

- a) Hydrochloric
- b) Nitric
- c) Sulfuric
- d) Hydrofluoric
- e) Phosphoric
- f) Chromic

3) Physical State

- a) Liquid solutions of acids and water.
- b) Solid sludges resulting from accumulation of solids at the bottom of acid tanks.

4) EPA Hazardous Waste Identification

- a) D002 - Corrosivity
- b) D007 - EP Toxic, Chromium, for item 2f above.

B) Alkalies

- 1) P&W uses several alkalies in its production process. The resulting alkali wastes are spent alkali/water solutions of varying concentrations. Alkali wastes are treated by neutralization, after which the neutralized solution flows to a final treatment plant for metal removal.

2) Types of Alkalies

- a) Sodium Carbonate, Sodium Bicarbonate
- b) Sodium Hydroxide
- c) Potassium Hydroxide
- d) Potassium Carbonate
- e) Potassium and Sodium Nitrate
- f) Trisodium Phosphate

3) Physical State

- a) Liquid solutions of alkali and water
- b) Solid alkali salts
- c) Solid sludges resulting from accumulation of solids at the bottom of alkali tanks.

4) EPA Hazardous Waste Identification

- a) D002 - Corrosivity

C) Chromium

- 1) P&W uses several chromium compounds in the production process. The resulting chromium wastes are spent chromium/water solutions of varying concentrations. Chromium wastes are treated by chemical reduction, after which the treated solution flows to a final treatment plant for metal removal.

2) Types of Chromium Compounds

- a) Chromic Acid
- b) Sodium Dichromate, Potassium Dichromate

3) Physical State

- a) Liquid solutions of chromium compounds and water
- b) Solid chromium salts
- c) Solid sludges resulting from accumulation of solids at the bottom of chromium tanks.

4) EPA Hazardous Waste Identification

- a) D002 - Corrosivity
- b) D007 - EP Toxicity - Chromium

D) Cyanide

- 1) P&W uses cyanide compounds in the production process. The resulting cyanide wastes are spent cyanide/water solutions of varying concentrations. Cyanide waste solutions are shipped to a commercial waste treatment facility for alkaline oxidation of the cyanide. Cyanide waste sludges are treated by alkaline chlorination on site, after which the treated solution flows to a final treatment plant for metal removal. Precious metal cyanide compounds are sent to an off-site vendor for metal reclamation.
- 2) Types of Cyanide Compounds
 - a) Sodium Cyanide
 - b) Potassium Cyanide
 - c) Copper Cyanide
 - d) Gold and Silver Cyanide
 - e) Potassium Silver Cyanide, Potassium Gold Cyanide
- 3) Physical State
 - a) Liquid solutions of cyanide compounds in water
 - b) Solid sludges resulting from accumulation of solids at the bottom of cyanide tanks.
- 4) EPA Hazardous Waste Identification
 - a) F007 - Spent cyanide plating bath solutions from electroplating operations.
 - b) F008 - Plating bath sludges from the bottom of plating baths from electroplating operations where cyanides are used in the process.
 - c) F009 - Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.

- d) PXXX - In addition, all of the above cyanides could be received as off-spec material and would carry the appropriate EPA number.

E) Wax/Solvents, Oil/Solvents

- 1) P&W uses solvents in degreasing operations, generating a waste wax/solvent or oil/solvent mixture. Most solvents are reclaimed by distillation, and the still bottoms after distillation and degreaser tank sludges are disposed of by incineration.
- 2) Types of Solvents
 - a) 1,1,1-Trichloroethane
 - b) Tetrachloroethylene
 - c) Trichlorotrifluoroethane
- 3) Physical State
 - a) Degreaser still bottoms and degreaser tank sludges are liquid to semi-solid, depending on the percentage of wax present.
- 4) EPA Hazardous Waste Identification
 - a) F001 - Spent halogenated solvents used in degreasing: 1,1,1-trichloroethane, tetrachloroethylene, and trichlorotrifluoroethane; and sludges from the recovery of these solvents in degreasing operations.

F) Solvents

- 1) P&W uses solvents in degreasing, cleaning, and laboratory operations, generating spent solvent wastes which are disposed of by incineration.*

* Also quantities of F002 waste streams are shipped to Hitchcock Gas Engine Co.
50 Cross Street
Bridgeport CT for treatment !!
i.e from 12/86 - 2/87 → 188,480 lb.!!

2/27/87 Tom Micket
Note!!

2) Types of Solvents

- | | |
|-----------------------------|---------------------------|
| a) Alcohols | k) Methyl Ethyl Ketone |
| b) Acetone | l) Methyl Isobutyl Ketone |
| c) Tetrachloroethylene | m) Xylene |
| d) 1,1,1-Trichloroethane | n) V.M.P. Naphtha |
| e) Trichloroethylene | o) Stoddard Solvent |
| f) Trichlorotrifluoroethane | p) Turpentine |
| g) Chloroform | q) Mineral Spirits |
| h) Toluene | r) Methylene Chloride |
| i) Carbon Tetrachloride | s) Ethylene Glycol |
| j) Cyclohexane | t) Ethyl Ether |

3) Physical State

- a) Solvent wastes are in liquid form.

4) EPA Hazardous Waste Identification

- a) D001 - Characteristic of Ignitability
- b) F001 - Spent halogenated solvents used in degreasing:
tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; and sludges from the recovery of these solvents in degreasing operations.
- c) F002 - Spent halogenated solvents: 1,1,1-trichloroethane, tetrachloroethylene, trichloroethylene, and trichlorotrifluoroethane; and the still bottoms from the recovery of these solvents.
- d) F003 - Spent non-halogenated solvents: xylene, acetone, methyl isobutyl ketone, butyl alcohol, methanol; and the still bottoms from the recovery of these solvents.
- e) F004 - Spent non-halogenated solvents: cresols and cresylic acid, and nitrobenzene; and the still bottoms from the recovery of these solvents.

- f) F005 - Spent non-halogenated solvents: toluene, methylethyl ketone, carbon disulfide, isobutanol, and pyridine: and the still bottoms from the recovery of these solvents.
- g) UXXX - In addition, all of the above solvents could be received as off-spec material and would carry the appropriate EPA number.

G) Paints and Paint Wastes

- 1) P&W uses paints and associated paint solvents in industrial and facility painting operations. Waste paints and paint solvents are disposed of by incineration.
- 2) Types of Paints and Solvents
 - a) Metal, Latex, and Oil Base Paints
 - b) Turpentine
 - c) V.M.P. Naphtha
 - d) Stoddard Solvent
 - e) Mineral Spirits
 - f) Petroleum Solvent
 - g) Lacquer Thinner
- 3) Physical State
 - a) Liquid paint solvents contaminated with paint.
 - b) Solid and semi-solid paint sludges containing paint solvent.
- 4) EPA Hazardous Waste Identification
 - a) D001 - Characteristic of Ignitability

H) Sludges

- 1) P&W produces two hazardous waste sludges, one from a shaft boring operation and one from a metal coating operation. Both sludges are disposed of by secure chemical landfill.

ISSUED: JUNE, 1977

ROUTINE JOB NO. 903

FREQUENCY: WEEKLY

INSPECTION GUIDE M-403

TREATMENT PLANT OPERATOR

NAME _____
CLOCK# _____
DATE _____
TIME REQUIRED _____
FOREMAN _____

PORTABLE WASTE TRANSPORT TANKS

SAFETY: COMPLY WITH ALL CURRENT SAFETY PRECAUTIONS.

CHECK POINTS:

DEFICIENCY REPORT

1. Piping, Valves: Check for leaks, loose connections, gaskets or other deficiencies. Adjust, tighten. Make minor repairs.
2. Disassemble Valves: Check for worn parts. Repair or replace as needed.
3. External Surfaces: Check for leaks, discoloration of paint, corroded and/or rusted areas. Tank should be clean and ALL identification signs clear and legible. Check all nuts and bolts to be sure they are properly secured. Replace damaged or missing nuts and bolts. Check skids for level and in good working order. Have deficiencies corrected as needed.
4. Internal Surfaces: Check internal surfaces, especially lining, for chips, cracks, hot spots (discoloration), soft areas. Have lining Spark Tested if necessary.
5. Cover: Check all surfaces for adequate protective coverage. Have deficient areas repaired as needed.
6. Float Assembly: Check for obstructions and see that it is working properly. Check cap and chain. Clean. Have deficiencies corrected.

DEFICIENCIES CORRECTED

DATE FOREMAN SIGNATURE

RCRA Part B Permit Applications
United Technologies
Pratt & Whitney
CTD 990672081

Page 36 of 212
REVISED: December 4, 1985

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DAILY INSPECTION OF STORAGE TANKS AND ASSOCIATED AREAS

RCRA Part B Permit Application
 United Technologies
 Pratt & Whitney Aircraft
 CTD 990672081

TANK LEVEL
 (FT. OF FREEBOARD)

Page 37 of 212
 March 22, 1985

STORAGE TANK	SUN	MON	TUES	WED	THUR	FRI	SAT
CN #1							
CN #2							
ALKALI							
CHROME							
BLEND							
ZYGLO							
ACID #1							
ACID #2							
WAX MELT							
KOLENE #1							
KOLENE #2							

DISCHARGE CONTROL EQUIPMENT (✓ indicates items inspected)

TRUCK PAD SUMP BY-PASS							

OPERATOR'S INITIALS _____

FOREMAN'S SIGNATURE _____

REMARKS:

SECTION - F - GENERAL CONTINGENCY PLAN

The General Contingency Plan consists of the following parts:

Part 1 Contingency Plan

Part 2 Evacuation Plan

Part 3 Emergency Spill Procedures

Part 4 Emergency Equipment

APPENDIX A Emergency Report Form

APPENDIX B Incompatible Waste

SECTION - F - GENERAL CONTINGENCY PLAN

Part 1 - Contingency Plan

I) Notification and Actions:

- A) In the event of fire, explosion, or any in-plant sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, or surface water that could threaten human health or the environment at the East Hartford Treatment and Storage Facilities, the operator or other individual involved, in addition to taking whatever action is necessary to contain or limit the accident, will notify the following personnel:

<u>Individual</u>	<u>Ext. Home Address</u>	<u>Home Phone</u>
1. Larry Lucia	3435 85 Orcuttville Road Stafford Springs, CT 06076	684-7170
J. Hurley (2nd shift) or	2097 101 South Road Marlborough, CT 06424	295-0797
R. Keene (3rd shift) or	2097 76 Colburn Road Stafford Springs, CT 06076	684-5221

Weekends and holidays -
Duty Maintenance
Foreman

4289*

AND

* Weekends and holidays call Guard Headquarters, Ext. 4289 and request that the Maintenance Foreman be paged.

2. Primary Emergency Coordinator

OR

Robert Farmer	4725	298 Reed Avenue	623-3747
		Windsor Locks, CT	
		06096	

- These departments, in turn, will determine if additional assistance is needed from the outside community and if evacuation or other action is required.

- | <u>Individual</u> | <u>Title</u> | <u>Phone Ext.</u> | <u>Home Phone</u> |
|---------------------|----------------------|-------------------|-------------------|
| R. C. Weiss
or | Plant Engineer | 4887 | 421-4743 |
| J. M. Gerrity
or | Asst. Plant Engineer | 7054 | 643-2372 |
| V. T. Spano | Mechanical Supt. | 2689 | 643-0516 |

General Contingency Plan (cont'd)

- D) Upon direction of the Plant Engineer or his designee, the emergency coordinator or supervisor of the Plant Engineering Environmental Protection Group will notify the following agencies if the situation could threaten human health or the environment outside the facility:
- | | | |
|--|------------------|--------------|
| National Response Center | Washington, D.C. | 800-424-8802 |
| Department of Environmental Protection - Connecticut | Hartford | 566-3338 |

- 1) Upon contact with the National Response Center, the following information must be provided:
- Name and telephone number of reporter;
 - Name and address of facility;
 - Time and type of incident (e.g., release, fire);
 - Name and quantity of material(s) involved, to the extent known;
 - The extent of injuries, if any; and
 - The possible hazards to human health, or the environment, outside the facility.

II Reporting of Emergency Incidents:

- A. After an emergency, within 15 days, the Plant Engineer or his designee will report to the following agencies only if the agency has been notified previously under emergency procedures:

- The Connecticut DEP
State Office Building
Hartford, Connecticut

(The appropriate report form attached as Appendix A)

General Contingency Plan (cont'd)

2. The Regional Administration
U.S. EPA
JFK Federal Building
Boston, MA 02203

B) The EPA report must include:

1. Name, address, and telephone number of the owner or operator;
2. Name, address, and telephone number of the facility;
3. Date, time and type of incident (e.g., fire, explosion);
4. Name and quantity of material(s) involved;
5. The extent of injuries, if any;
6. An assessment of actual or potential hazards to human health or the environment, where this is applicable; and
7. Estimated quantity and disposition of recovered material that resulted from the incident.

III Arrangements With Local Authorities

- A) P&W has been a member of the community of East Hartford, Connecticut for over 50 years and throughout that time there has been a reciprocal arrangement between P&W and the Town of East Hartford to respond with Security, Fire or Medical personnel and equipment whenever either might request assistance. The Pratt and Whitney facility in East Hartford supports a full time security force of 125 employees, a full time fire department of 76 employees, and a full time medical staff of 26 employees. The security and fire department coverage is on a 24 hr/day, 7 day/week basis, and the medical staff coverage is on a 24 hr/day, 5 day/week coverage, with weekend coverage whenever the overtime population warrants. In addition P&W maintains the following emergency equipment: four fire trucks, three fire department vehicles, four security vehicles, one ambulance, and numerous specialized fire, security, and ambulance vehicles for use inside the factory.

General Contingency Plan (cont'd)

IV. Amending of Plan

A) P&W will review, and immediately amend if required the contingency plan whenever any of the following occur:

1. The facility permit is revised.
2. The plan fails in an emergency.
3. The facility changes - in its design, construction, operation, maintenance or other circumstances - in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes the response necessary in an emergency.
4. The list of emergency coordinators changes.
5. The list of emergency equipment changes.

General Contingency Plan (cont'd)

PART 2 - EVACUATION PLAN

- I In the event of a sudden and uncontrollable occurrence such as fire, explosion, or major uncontrollable chemical spill, and if degree of risk precludes making an effort to stop or diminish the effects of the occurrence, the area of the occurrence should be evacuated immediately and in an orderly and efficient manner, utilizing any of the several exits (described below) available at the treatment areas. The alarm mechanism vocal will be over the public address system which will notify all sections of the Concentrated Waste Treatment Area of emergency instructions. Once evacuation has been called, employees shall proceed to the nearest building exit, leave the area, and assemble in front of the Maintenance Building on Willow Street immediately for check in. Exhibit CC provides an evacuation map, designating the building exits described in Section II below and possible evacuation routes. As soon as possible after the occurrence, the following notification procedure should be followed:

Fire Headquarters	X-5097
Emergency Medical Services(if required)	X-7736
Guard Headquarters	X-4289

After the above are notified, resume the notification schedule, Notification and Action, page 34 from the beginning.

II Building Exits

A) Concentrated Waste Treatment Plant - Main Building

- 1) Pedestrian door exits are located as follows:
 - a) South side ground level (level between basement and first floor). Exit under treatment platform to outside door on south side or into main building to outside door on east side.

General Contingency Plan (cont'd)

- b) East side first floor exits to treatment plant yard.
 - c) South side platform level (level between first and second floor). Exit across treatment platform and down stairs to south side outside door or into Main Building and to outside door on east side.
- 2) Other exits are located as follows:
 - a) West side ground level - Exit folding doors to treatment plant yard.
 - b) East side first door, transporter repair area - exit overhead door to treatment plant yard.
- B) Concentrated Waste Treatment Plant - Waste Storage Building
 - 1) Pedestrian door exits are located as follows:
 - a) North side first floor exit to treatment plant yard.
 - b) West side first floor exit to treatment plant yard.
 - 2) Other exits are located as follows:
 - a) West side first floor overhead door exits to treatment plant yard.
 - b) South side of building is completely open, exit to treatment plant yard.
- C) Concentrated Waste Treatment Plant - Incinerator Building
 - 1) Pedestrian door exits are located as follows:
 - a) East side of building has two doors, open on each corner, exit to treatment plant yard.
 - b) North side has open area, exit to treatment plant yard.

General Contingency Plan (cont'd)

- D) Concentrated Waste Treatment Plant - Yard Area
 - 1) Fence exits are located on the East, West, and South sides of the yard, exit to maintenance building area, Willowbrook Road, and Willow Street respectively.

General Contingency Plan (cont'd)

PART 3 - EMERGENCY SPILL PROCEDURES

I The following procedures have been developed to respond to spills of hazardous waste:

A) Acids & Chromes

1. Eliminate source of spill if possible, without risk.
2. Dike spill area with soda ash (Sodium Carbonate).
3. Remove *incompatible materials.
4. Remove objects in spill area that have not yet been contacted.
5. Soak up spilled material with soda ash and remove for treatment.
6. After all soda ash has been removed, rinse spill area with water and drain to appropriate line.

* Attached Appendix B
Incompatible Waste

B) Alkalies

1. Solid Material

- a. Eliminate source of spill if possible, without risk.
- b. Pick up spilled material and remove for treatment.
- c. Rinse spill area and any contacted objects with water and drain to appropriate line.

2. Liquid Material

- a. Eliminate source of spill if possible, without risk.
- b. Dike spill area with soda ash or sand.

General Contingency Plan (cont'd)

- c. Remove incompatible materials.
- d. Remove objects which haven't been contacted.
- e. Soak up spill with sand and remove for treatment.
- f. After removing sand, rinse spill area with water and drain to appropriate line.

C) Cyanides

- 1. Eliminate source of spill if possible, without risk.
- 2. Dike spill area with soda ash (Sodium Carbonate).
- 3. Remove incompatible materials.
- 4. Remove objects in spill area that have not yet been contacted.
- 5. Soak up spilled material with soda ash and remove for treatment. If solution is too strong for in-plant treatment, place in cyanide storage tank. Be sure all contacted material is removed for treatment.

D) Wax/Solvent, Oil/Solvent, Solvents, Paints

- 1. Eliminate source of spill if possible, without risk
- 2. Remove sources of ignition.
- 3. Dike spill area with sawdust.
- 4. Remove objects in spill area that have yet been contacted.
- 5. Soak up spilled material with sawdust. Remove for incineration.

- II In the event of a sudden and non-controllable occurrence, personnel will follow any steps that are possible, without risk to themselves, which will help minimize the effect of the occurrence. Valves will be manually closed, if needed, and pumps shut-off to help minimize the problem.

General Contingency Plan (cont'd)

PART 4 - EMERGENCY EQUIPMENT

- I Concentrated Waste Treatment Plant - Main Building
 - A) Spill Control Equipment capable of containing and cleaning up spills
 - 1) Shovels, rakes, and brooms
 - 2) Barrels, transporters and pumps
 - 3) Soda ash, oil spill control booms, absorbent material
 - B) Communication Equipment
 - 1) Telephones - two in office, and one just inside Main building East door
 - 2) PA System
 - C) Fire Extinguishing Equipment
 - 1) 2 1/2 G water, 1st floor
 - 2) 15 lb carbon dioxide, 1st floor
 - 3) 6 lb ABC, 2nd floor
 - D) Personnel Safety Equipment
 - 1) Full protective clothing, face shields, boots, aprons, gloves
 - 2) Respirators
 - 3) Scott air paks, (2) on first floor - 30 minutes duration
 - 4) Shower
 - a) Platform
 - b) Outside of office door
 - c) Basement
 - 5) Eye Wash Station
 - a) Inside East door

General Contingency Plan (cont'd)

- b) Basement
- c) Laboratory

II Concentrated Waste Treatment Plant - Barrel Storage Building

A) Spill Control Equipment capable of containing and cleaning up spills

- 1) Shovels, rakes and brooms
- 2) Barrels
- 3) Sawdust, and absorbent material

B) Fire Extinguishing Equipment

- 1) 30 lb ABC, outside
- 2) 6 lb ABC, inside

C) Personnel Safety Equipment

- 1) Shower - northeast corner
- 2) Eye Wash Station - northeast corner

III Concentrated Waste Treatment Plant - Incinerator Building

A) Spill Control Equipment

- 1) Sawdust

B) Fire Extinguishing Equipment

- 1) 30 lb ABC, outside
- 2) 6 lb ABC, inside

IV Exhibit DD provides maps showing the approximate locations of the emergency equipment. The map for the main building has all equipment for the three floors located on the single floor map.

V Equipment Maintenance

- A. All Fire Safety equipment is routinely inspected and maintained by the Pratt & Whitney Fire Department according to the National Fire Protection Codes. Equipment includes fire extinguishers and Scott air packs which are immediately recharged after use. Records of Compliance with the codes are kept by the Fire Department.
- B. As a matter of practice, the other emergency equipment is always replaced after it is used. All materials that are used in emergencies are always available at nearby Plant Engineering Cribs.

RCRA Part B Permit Application
United Technologies
Pratt & Whitney
CTD 990672081

Page 52 of 212
March 22, 1985

APPENDIX A

GENERAL CONTINGENCY PLAN



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115



RCRA Part B Permit Application

United Technologies

Pratt & Whitney Aircraft

CTD 990672081

Page 53 of 212

March 22, 1985

REPORT OF PETROLEUM OR CHEMICAL PRODUCT
DISCHARGE, SPILLAGE, SEEPAGE, FILTRATION

The following information is submitted concerning petroleum or chemical product discharge reported verbally to the Department of Environmental Protection/State Police at _____ on _____ at _____

(location)

(date)

(time)

by _____
(name)

1. Time and date of discharge, spillage, etc.

2. Location, to include name of town, river, highway, distance from intersection, etc., of the pollution or contamination.

3. Type of oil, petroleum or chemical pollutant or contaminant.

4. Quantity of discharge, spillage, seepage, filtration.

5. Cause of pollution or contamination:

- a. Type of vessel, vehicle, containers, etc., which contained the pollutant or contaminant _____

- b. Describe in detail what actually occurred to cause discharge, spillage, seepage, filtration.

- 2 -

- c. If pollutant or contamination was a result of discharge, spillage, seepage, filtration from a moving vessel or vehicle, give location of departure and destination.

6. Name and address of owner of ship, boat or other vessel, terminal, establishment, vehicle, trailer or machine causing such pollution or contamination.

7. Name and address of person making this report.

8. Title, or relationship to owner, of person making report.

All statements contained herein are true to the best of my knowledge.

Signature of Person Making Report

RCRA Part B Permit Application
United Technologies
Pratt & Whitney
CTD 990672081

Page 55 of 212
March 22, 1985

APPENDIX B

GENERAL CONTINGENCY PLAN

- 2) Types of Sludges
 - a) Sulfur, often containing soluble cutting oil.
 - b) Aluminum Oxide Powder, containing Ammonium Chloride.
- 3) Physical State
 - a) Solid
- 4) EPA Hazardous Waste Identification
 - a) D003 - Characteristic of Reactivity

I) Laboratory Chemicals and Commercial Chemical Products

- 1) P&W has three major laboratory facilities which produce waste laboratory chemicals, and P&W purchases many commercial chemical products for use in its plants. These items become waste products through obsolescence or expired shelf life, and are disposed of by secure chemical landfill.
- 2) Type of Waste
 - a) Small quantities of laboratory chemicals including acids, alkalies, salts, solvents, organics, inorganics, etc.
 - b) Small quantities of commercial chemical products including resins, epoxies, chemical coatings, cleaners, lubricants, absorbents, polymers, etc.
- 3) Physical State
 - a) Solid
 - b) Liquid
 - c) Gaseous
 - d) Semi-solid
 - e) Paste

- 4) EPA Hazardous Waste Identification
 - a) D001 - Characteristic of Ignitability
 - b) D002 - Characteristic of Corrosivity
 - c) D003 - Characteristic of Reactivity
 - d) D004 - EP Toxicity - Arsenic
 - e) D005 - EP Toxicity - Barium
 - f) D006 - EP Toxicity - Cadmium
 - g) D007 - EP Toxicity - Chromium
 - h) D008 - EP Toxicity - Lead
 - i) D009 - EP Toxicity - Mercury
 - j) D010 - EP Toxicity - Selenium
 - k) D011 - EP Toxicity - Silver
 - l) P001 D-Con Wasp/Hornet Killer
 - m) P002 Carbon Disulfide
 - n) P029 Copper Cyanide
 - o) P030 Cyanides
 - p) P098 Potassium Cyanide
 - q) P099 Potassium Silver Cyanide
 - r) P106 Sodium Cyanide
 - s) P122 Zinc Phosphide
 - t) U002 Acetone
 - u) U019 Benzene
 - v) U021 Benzidine
 - w) U031 N-Butyl Alcohol
 - x) U044 Chloroform
 - y) U052 Cresols
 - z) U054 Cresylic Acid
 - aa) U055 Cumene
 - bb) U056 Cyclohexane

EPA Hazardous Waste Identification (cont'd)

cc) U077	1,2 Dichloroethane
dd) U080	Dichloromethane
ee) U108	1,4 Dioxane
ff) U112	Ethyl Acetate
gg) U122	Formaldehyde
hh) U123	Formic Acid
ii) U133	Hydrazine
jj) U134	Hydrofluoric Acid
kk) U138	Iodomethane
ll) U140	Isobutyl Alcohol
mm) U144	Lead Acetate
nn) U151	Mercury
oo) U154	Methanol
pp) U159	Methyl Ethyl Ketone
qq) U161	Methyl Isobutyl Ketone
rr) U165	Naphthalene
ss) U168	2-Naphthylamine
tt) U242	Pentachlorophenol
uu) U188	Phenols
vv) U201	Resorcinol
ww) U210	Tetrachloroethylene
xx) U220	Toluene
yy) U223	Toluene Diisocyanate
zz) U226	1,1,1-Trichloroethane
aaa) U228	Trichloroethylene
bbb) U121	Trichlorofluoromethane
ccc) U239	Xylene

The test methods used to analyze for the parameters listed in tables C-1 and C-2 will be those described in:

Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods
EPA Publication SW-846
Office of Solid Waste
Washington, D.C. 20460
July 1982

and as time to time revised in this volume.

Sample methods shall be as defined in EPA publication SW-846, Test Methods for Evaluating Solid Waste, or as otherwise defined below. The appropriate sampling method in Table B-2 which best fits the general waste description will be used.

TABLE B-2

WASTE	METHOD
Containerized liquids	Coliways
Extremely viscous liquids	ASTM Standard D140-70
Crushed or powdered material	ASTM Standard D346-75
Soil or rock-like material	ASTM Standard D1452-65
Fly Ash-like material	ASTM Standard D2234-76

SECTION - C - WASTE ANALYSIS PLAN

- I) All waste is initially identified as described in Section - B - Waste Descriptions and Analyses.
- II) An analysis will be conducted on a waste sample under the following conditions:
 - A) The treatment plant operator suspects that the characteristics of the waste have changed.
 - B) We have been notified that the process producing the waste has changed.
 - C) The treatment plant operator does not feel that the waste material conforms to the description on the internal manifest.
 - D) Wastes contained in process tanks will be sampled when the tank is going to be emptied of its existing contents and used for a different purpose.
- III) The wastes received at P&W are expected to remain constant in composition. However, if it is suspected that the waste characteristics have changed, the waste will be analyzed for those parameters listed in table C-1 under the heading PARAMETERS, and this information will be sufficient to describe minor variations in waste composition and will verify required method of disposal. The waste may be analyzed for the parameters listed under the heading POSSIBLE ADDITIONAL PARAMETERS, the specificity of analysis being determined by the background information received on the waste, and this information will be sufficient to describe major changes in waste characteristics and will verify the required method of disposal. Table C-2 provides the analytical methods required for analysis of these parameters. Exhibit F thru Exhibit K are representative laboratory analyses.

TABLE C-1

PARAMETERS FOR ANALYSIS

<u>CATEGORY</u>	<u>HAZARDOUS WASTE NUMBER</u>	<u>PARAMETERS</u>	<u>POSSIBLE ADDITIONAL PARAMETERS</u>
Acid	D002	pH	Metals Acid type Acid strength
Alkali	D002	pH	Metals Alkali type Alkali strength
Chromium	D002 D007	pH Hexavalent chromium	Metals Total Chromium acid strength
Cyanide	F007 F008 F009	pH Total cyanide	Metals Cyanide amenable to chlorination
Wax/solvents Oil/solvents	F001 F002	Flash pt BTU/lb % solvent	Type of solvent(s) Halogen and sulfur Organics
Solvents	D001 F001 F003	Flash pt. BTU/lb	Type of solvent(s) % of each solvent Halogen and sulfur
Paints and Paint Wastes	D001	Flash pt. BTU/lb	Metals % solids
Sulfur and Aluminum Oxide Sludges	D003	Flash pt.	Metals % Solids
Laboratory Chemicals Commercial Chemical Products	D001, D002 D003, D004 D005, D006 D007, D008 D009, D010 D011 Items in 261.33 e and f as listed in Section B-I4	pH EP Toxicity	As needed for positive identification

TABLE C-2

ANALYTICAL METHODS

<u>PARAMETER</u>	<u>EXTRACTION*</u>	<u>ANALYSIS*</u>
Arsenic	6010	7060 or 7061
Barium	6010	7080 or 7081
Cadmium	6010	7090 or 7091
Chromium	6010	7190 or 7191
Chromium (+6)	6010	7195, 7196, 7197, or 7198
Copper	6010	7210 or 7211
Iron	6010	7380 or 7381
Lead	6010	7420 or 7421
Manganese	6010	7460 or 7461
Mercury	6010	7470 or 7471
Nickel	6010	7520 or 7521
Selenium	6010	7740 or 7741
Silver	6010	7760 or 7761
Zinc	6010	7950 or 7951
Cyanide	N/A	9010
pH	N/A	9040
Flash Point	N/A	1010, 1020
Solvent type	Direct Injection or 5020 or 5030	8010, 8015, or 8020

*All extraction and analysis methods are as described in EPA publication SW-846, and as time to time ammended.

IV Quality control of the samples will be maintained by:

1. Sampling with the appropriate instrument.
2. Use of the appropriate sample container and preservation techniques for the parameters of interest as described in SW-846.
3. Only persons instructed in using particular sampling devices shall take the sample.

Quality control of analysis will be maintained by:

1. Using the appropriate analytical methods as described in SW-846.
2. Using only State Certified Laboratories for Analysis. The State of Connecticut has its own strict Quality Control Procedures which laboratories must meet before certification is given.

SECTION - D - SECURITY PROCEDURES AND EQUIPMENT

- I The unknowing entry of persons or livestock onto the active portion of the facility is prevented by the following measures:
- A) The Hazardous Waste Management facility is surrounded by a fence, and signs have been posted near all gates, and on all approaches to the facility stating the following:

NOTICE

AUTHORIZED PERSONNEL ONLY
ENTRY MAY BE DANGEROUS

- B) Exhibit BB (2 Pages) provides the location of all appropriate signs in the Hazardous Waste Management Facility along with the specific wording of these signs. The treatment facility is staffed on a 24 hour basis during weekdays. The entire East Hartford complex is staffed on a 24hr/day, 7 day/wk basis by security and fire personnel.
- C) In addition to the fence around the Hazardous Waste Management facility, the entire East Hartford Complex is surrounded by a fence, and entrance gates are staffed with security guards on a 24 hr/day, 7 day basis. Only employees wearing employee identification badges are allowed on the property. Furthermore, the plant is patrolled by security guards in cruisers, and the active portion of the facility, as well as the remote areas of the larger plant, are continuously monitored by closed circuit television at Security Headquarters.

SECTION - E - GENERAL INSPECTION SCHEDULE

- I) The treatment and storage areas are inspected as required to avoid any release of hazardous waste constituents to the environment and any threats to human health.
- II) Inspections are conducted and recorded as described herein and inspection records maintained for three years.
- III) PM System:
 - A) A preventive maintenance system (PM) is in use at P&W which initiates the inspection of equipment so that repairs can be made before breakdowns occur. At predetermined intervals a computer card is issued for a particular piece of equipment, and the receiver of the card performs a preventive maintenance check on the piece of equipment according to a prescribed inspection procedure. After the inspection is completed, the card is returned to the computer center and the date of completion of the inspection is entered into the computer. The inspector also records his time spent on the inspection, and in this way completion of the required inspection is assured.
 - B) RCRA required facility inspections are also initiated and recorded through the use of the PM system. Cards are issued for each area requiring inspection at the time intervals required, and the inspection takes place using developed forms as provided in this section according to the described procedures. After inspection the card is returned, the amount of time spent on the inspection recorded, and the completed inspection form submitted to the foreman.

General Inspection Schedule (cont'd)

IV) Inspection Methods:

- A) Inspections of equipment and areas are conducted in a manner acceptable for preventive maintenance.
- B) The receipt of a computer card for a particular area signifies that inspection is required, and the inspection is conducted by the CWT operator assigned to the area requiring inspection using the inspection guides shown in this section. After inspection, the inspection guide is completed and given to the foreman, who signs the form. The foreman has the responsibility for correcting any deficiencies noted on the report, and for filing the report. The foreman indicates on the inspection report the date the deficiency was corrected, and reports these corrections in writing to his General Foreman on a monthly basis. The following will be the frequency of inspections:

<u>AREA</u>	<u>FREQUENCY</u>
Barrel Storage Areas	Weekly
Tanker Unloading Areas	Daily
CWTP Storage and Treatment Tanks	Weekly
Discharge Control Equipment	Daily
Transporter Storage Pad	Weekly
Incinerator	Daily, weekly, and while in use.

ISSUED: JANUARY, 1982

ROUTINE JOB NO. 566

FREQUENCY: WEEKLY

INSPECTION GUIDE M-566

TREATMENT PLANT OPERATOR

NAME _____

CLOCK# _____

DATE _____

TIME REQUIRED _____

FOREMAN _____

Barrel Storage Area CWTP

SAFETY: COMPLY WITH ALL CURRENT SAFETY PRECAUTIONS.

CHECK POINTS:

ALL AREAS

DEFICIENCY REPORT

1. Barrels: Visually inspect barrels for signs of leaks, weakness or deterioration. Check floor area under barrels for signs of leaking. Remove and repack barrels where necessary. Count number of barrels and record.

Count is _____ barrels. (Should be less than 500. If over, note deficiency).

2. Pallets Visually inspect pallets for breaks, weakness, or deterioration. Remove barrels from pallet and replace pallet where necessary.

3. Floor: Check floor for signs of cracks, faults, or other deterioration.

4. Barrel Stacking: Check barrels for unsteady stacking and reposition any unsteady barrels.

5. Sumps: Check sumps for liquid, debris, or other matter and clean sumps where necessary following procedure in Section M.

6. Report deficiencies to Foreman.

DEFICIENCIES CORRECTED

DATE FOREMAN SIGNATURE

RCRA Part B Permit Applications
United Technologies
Pratt & Whitney
CTD 990672081

Page 31a of 212
NEW: December 4, 1985

ISSUED: NOVEMBER 1985

TREATMENT PLANT OPERATOR

ROUTINE JOB NO. 943

NAME _____

FREQUENCY: WEEKLY

CLOCK# _____

DATE _____

INSPECTION GUIDE M-943

TIME REQUIRED _____

FOREMAN _____

BARREL STORAGE AREA CWT - LIQUIDS
TOTAL AND LIQUID BARREL CONTROLS

SAFETY: COMPLY WITH ALL CURRENT SAFETY PRECAUTIONS.

<u>AREAS TO CHECK</u>	<u>TOTAL NUMBER BARRELS</u>	<u>TOTAL BARRELS WITH LIQUIDS</u>	<u>DEFICIENCY REPORT</u>
1. Chemical Products (32)	_____ If count is greater than 144, note deficiency	_____ If count is greater than 30, note deficiency	
2. Paint Waste (21)	_____ If count is greater than 144, note deficiency	_____ If count is greater than 50, note deficiency	
3. Wax Chlorinated Solvents (20)	_____ If count is greater than 170, note deficiency	_____ If count is greater than 150, note deficiency	

4. Report deficiencies to Foreman

DEFICIENCIES CORRECTED

DATE

FOREMAN SIGNATURE

RCRA Part B Permit Application
United Technologies
Pratt & Whitney
CTD 990672081

Page 32 of 212
March 22, 1985

ISSUED: JANUARY, 1982

ROUTINE JOB NO. 567

FREQUENCY: DAILY

INSPECTION GUIDE M-567

TREATMENT PLANT OPERATOR

NAME _____

CLOCK# _____

DATE _____

TIME REQUIRED _____

FOREMAN _____

Tanker Unloading Areas CWTP

PAD # 1, 2, 3

SAFETY: COMPLY WITH ALL CURRENT SAFETY PRECAUTIONS.

CHECK POINTS:

ALL AREAS

DEFICIENCY REPORT

1. Floor: Check floor for signs of cracks, faults or other deterioration.
2. Piping: Check piping for leaks, cracks, sags, or other deterioration.
3. Valves: Check all valves for operation and for leaks. Sump valves must be CLOSED when pad IS in use. Sump valves must be open when truck pads are not in use.
4. Sumps: Check sumps for liquid, debris, or other matter and clean where necessary following procedures described in Section M.
5. Report deficiencies to Foreman.

DEFICIENCIES CORRECTED

DATE

FOREMAN SIGNATURE

RCRA Part B Permit Application
United Technologies
Pratt & Whitney
CTD 990672081

Page 33 of 212
March 22, 1985

ISSUED: JANUARY, 1982

ROUTINE JOB NO. 569

FREQUENCY: WEEKLY

INSPECTION GUIDE M-569

TREATMENT PLANT OPERATOR

NAME _____
CLOCK# _____
DATE _____
TIME REQUIRED _____
FOREMAN _____

STORAGE AND TREATMENT TANKS CWTP

SAFETY: COMPLY WITH ALL CURRENT SAFETY PRECAUTIONS.

CHECK POINTS:

ALL AREAS
DEFICIENCY REPORT

1. Tanks: Check for leaks or deterioration in tank walls, seams, and covers.
2. Containment Area: Check for the presence of cracks, faults, leaks, etc. Check for the presence of standing liquid, debris, or other matter. Clean up where necessary.
3. Pipelines: Check lines leading to and from tank for leaks, cracks, sags, or other areas of deterioration.
4. Pumps: Check tank associated pumps for leaks and operational problems. Check pump sumps for liquid, debris, or other matter, and clean up where necessary.
5. Valves: Check valves for leaks and operational problems.
6. Tank Interior: Check the interior of the tanks for cracks, faults and deterioration of the walls when tank is empty.
7. Report deficiencies to Foreman.

DEFICIENCIES CORRECTED

DATE FOREMAN SIGNATURE

RCRA Part B Permit Application
United Technologies
Pratt & Whitney
CTD 990672081

Page 34 of 212
March 22, 1985

ISSUED: JANUARY, 1982

ROUTINE JOB NO. 572

FREQUENCY: WEEKLY

TREATMENT PLANT OPERATOR

NAME _____

CLOCK# _____

DATE _____

INSPECTION GUIDE M-572

TIME REQUIRED _____

FOREMAN _____

Transporter Storage Pads CWTP
(Detached Pad East Side of Office Building
and attached pad South Side of Office Building)

SAFETY: COMPLY WITH ALL CURRENT SAFETY PRECAUTIONS.

CHECK POINTS:

ALL AREAS

DEFICIENCY REPORT

1. Floor: Check floor for signs of cracks, faults or other deterioration.
2. Sumps: Check sumps for liquid, debris, or other matter and clean where necessary following procedures described in Section M.
3. Report deficiencies to Foreman.

DEFICIENCIES CORRECTED

DATE

FOREMAN SIGNATURE

General Contingency Plan (cont'd)

INCOMPATIBLE WASTE

GROUP 1-A

ACETYLENE SLUDGE
ALKALINE CAUSTIC LIQUIDS
ALKALINE CLEANER
ALKALINE CORROSIVE LIQUIDS
ALKALINE CORROSIVE BATTERY FLUID
CAUSTIC WASTEWATER
LIME SLUDGE & CORROSIVE ALKALIES

LIME WASTEWATER
LIME AND WATER
SPENT CAUSTIC

GROUP 1-B

ACID SLUDGE
ACID AND WATER
BATTERY ACID
CHEMICAL CLEANERS
ELECTROLYTE, ACID
ETCHING ACID LIQUID OR SOLVENT
PICKLING LIQUOR AND CORROSIVE
ACIDS
SPENT ACID
SPENT MIXED ACID
SPENT SULFURIC ACID

POTENTIAL CONSEQUENCES: HEAT GENERATION; VIOLENT REACTION

GROUP 2-A

ALUMINUM
BERYLIUM
CALCIUM
LITHIUM
MAGNESIUM
POTASSIUM
SODIUM
ZINC POWDER
OTHER REACTIVE METALS & METAL HYDRIDES

GROUP 2-B

ANY WASTE IN GROUP 1-A OR 1-B

POTENTIAL CONSEQUENCES: FIRE, EXPLOSION, GENERATION OF FLAMMABLE
HYDROGEN GAS.

General Contingency Plan (cont'd)

GROUP 3-A

ALCOHOLS

WATER

GROUP 3-B

ANY CONCENTRATED WASTE IN GROUPS
1-A or 1-B

CALCIUM

LITHIUM

METAL HYDRIDES

POTASSIUM

OTHER WATER REACTIVE WASTE

POTENTIAL CONSEQUENCES: FIRE, EXPLOSION, HEAT GENERATION, GENERATION OF
FLAMMABLE OR TOXIC GASES.

GROUP 4-A

ALCOHOLS

ALDEHYDES

HALOGENATED HYDROCARBONS

NITRATED HYDROCARBONS

UNSATURATED HYDROCARBONS

OTHER REACTIVE ORGANIC COMPOUNDS
& SOLVENTS

GROUP 4-B

CONCENTRATED GROUP 1-A or 1-B
WASTE

GROUP 2-A WASTE

POTENTIAL CONSEQUENCES: FIRE, EXPLOSION, OR VIOLENT REACTION.

General Contingency Plan (cont'd)

GROUP 5-A

GROUP 5-B

SPENT CYANIDE & SULFIDE SOLUTIONS

GROUP 1-B WASTE

POTENTIAL CONSEQUENCES: GENERATION OF TOXIC HYDROGEN CYANIDE OR
HYDROGEN SULFIDE GAS

GROUP 6-A

GROUP 6-B

CHLORATES

ACETIC ACID & ORGANIC ACIDS

CHLORINE

CONCENTRATED MINERAL ACIDS

CHLORITES

GROUP 2-A WASTE

CHROMIC ACID

GROUP 4-A WASTE

HYPOCHLORITES

FLAMMABLE & COMBUSTIBLE WASTE

NITRATES

NITRIC ACID, FUMING

PERCHLORATES

PERMANGANATES

PEROXIDES

OTHER STRONG OXIDIZERS

POTENTIAL CONSEQUENCES: FIRE, EXPLOSION, OR VIOLENT REACTION.

SECTION - G - GENERAL HAZARDOUS WASTE FACILITY PROCEDURES

I Procedures structures and equipment

A) Prevention of Unloading Hazards - Concentrated Waste Treatment Plant Storage Building

- 1) Tankers are loaded and unloaded on concrete loading pads which are as large as a tanker and sloped to a containment pit with the capacity to contain the contents of the tanker as well as precipitation from a 25 year 24 hour storm. There are three pads in use separated into the categories of Acids, Alkali and Cyanide, and Oil. Each tanker pad has its own separate 500 gallon containment pit. Only if the spill is greater than 500 gallons will the liquid overflow this pit to a common 5000 gallon underground tank. The containment pits are checked for liquids before and after transfer operations. If liquids are detected, all liquids in the containment pits and underground tank will be pumped to the appropriate treatment tank. In addition, all spills onto the pads are washed down into the containment system, and pumped and treated accordingly. A bypass exists to direct rainwater from the pads directly to the wastewater treatment system. Procedures also call for this bypass to be closed at all times when waste transfer operations are occurring.
- 2) Drums, strapped to pallets, are loaded and unloaded directly from trucks into the building at a truck dock on the west side of the storage building. The building has several containment areas built under the floor, and the floors are sloped so that all spills are directed into containment. The containment pits must be pumped out manually into the treatment tanks and treated as required.
- 3) Transporters are unloaded onto specially constructed platforms on the south side of the building. When placed on the platform, the transporter slopes

General Hazardous Waste Facility Procedures (cont'd)

downward for gravity discharge into a receiving line to bulk storage tanks. Previously mentioned containment pits in this building will contain any spills from transporters. If a transporter cannot be immediately emptied, it is stored on one of the transporter storage pads until it can be emptied.

B) Runoff Prevention

- 1) All areas where hazardous waste is stored have complete containment to prevent runoff.

C) Prevention of Water Supply Contamination

- 1) All areas where hazardous waste is stored have complete containment to prevent runoff. There are no water supplies in the area.

D) Mitigation of Effects of Power Failure

- 1) In the event of a power failure, activity in the Concentrated Waste Treatment Plant area will halt until power is restored. Since all operations are manually controlled and there is no continuous flow into the storage tanks, there is no danger of overflow or incomplete treatment during a power failure.

E) Prevention of Exposure of Personnel

- 1) Personal Protective Equipment is available (see Contingency Plan - Emergency Equipment). All OSHA requirements are strictly followed.
- 2) Incinerator Building wax storage tank has exhaust system.
- 3) Employees are trained in the correct procedures to handle hazardous waste and how to limit personal exposure.

General Hazardous Waste Facility Procedures (cont'd)

II Prevention of Accidental Ignition or Reaction

- A) Flammable and No Smoking signs are posted where applicable in the designated areas on Exhibit BB
- B) Incompatible materials and their containment areas are kept separate
- C) Open flames, cutting and welding are allowed only with approval and supervision of the Fire Department.

III Traffic Patterns

- A) Traffic routes are shown on the Facility Location Map, Exhibit A. The nearest major highways (Route 2 and I-84) are indicated. Trucks traveling Route 2 will use the Willow Street Exit and enter the facility through the Willow Street gate. Trucks then proceed on Willow Brook Road to the CWTP. Trucks exiting from I-84 proceed through the Silver Lane entrance gate onto West Connector Road, to Willow Brook Road and the CWTP. The maximum weight of fully loaded trucks entering the facility is 80,000 lbs. Approximately 100 tankers and 250 trailers containing hazardous waste enter the facility per year. The in-plant load bearing capacity of the road is 14,000 pounds per square foot and the road surfacing is bituminous concrete.

SECTION - H - FACILITY LOCATION INFORMATION

- I Seismic Considerations - This facility, located in the Town of East Hartford, Hartford County, Connecticut, is an existing facility and therefore the seismic standard does not apply.

- II Floodplain location - Willow Brook runs east to west through the north end of the P&W East Hartford complex. There is a dam and pond in the vicinity of the waste treatment facilities. The 100 year flood level is 33.3 feet and is located within the pond embankments. In fact the 500 year flood level is 36.1 feet which would also be contained. The source of the flood level data is the Flood Insurance Study for the Town of East Hartford, Connecticut, dated August 1979 prepared by the U.S. Department of Housing and Urban Development, Federal Insurance Administration. Figure H-1 contains the appropriate Willow Brook Flood Profiles as reported in this study.

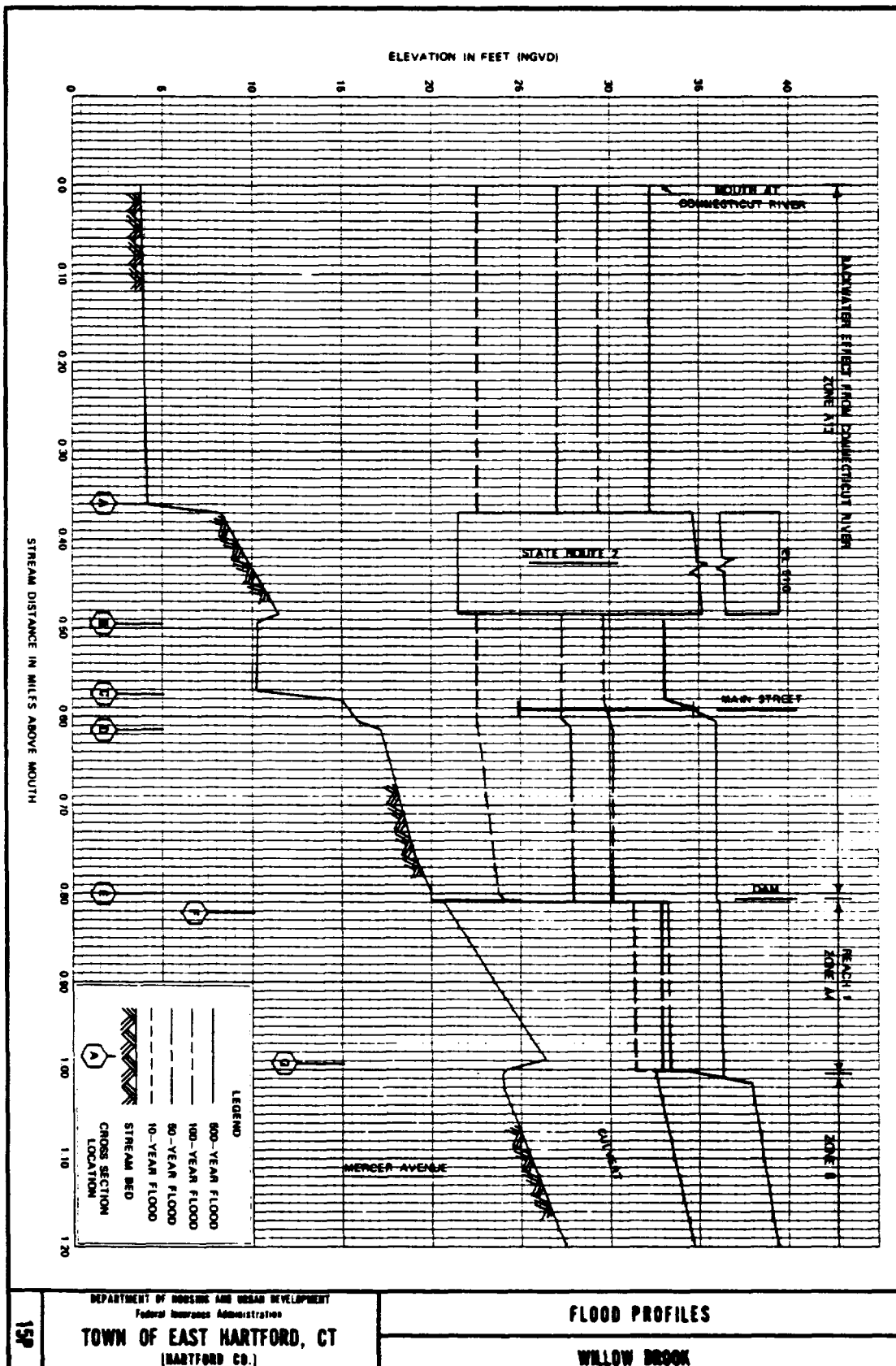


FIGURE H-1

SECTION - I - PERSONNEL TRAINING

I Introductory Training - A ten hour training course was given to all treatment plant operators, foremen, General Foremen and other associated personnel to train employees to meet government regulations in relation to their job tasks, covering specific waste treatment practices and procedures. An outline of the original training course follows:

- A) Company Environmental Policy

- B) Hazardous Materials
 - 1) DOT requirements
 - 2) Definitions
 - 3) CFR Title 49 Hazardous Materials Table
 - 4) Hazard Classes

- C) Hazardous Wastes
 - 1) EPA requirements
 - a) Manifests
 - b) Penalties
 - 2) Definitions
 - 3) Hazardous Waste Classes
 - a) Ignitability
 - b) Corrosivity
 - c) Reactivity
 - d) Toxicity
 - e) Hazardous Waste Lists
 - 4) Incompatible Wastes and Toxic Hazards

- D) Commonly Handled Wastes at Pratt & Whitney
 - 1) Hazard descriptions
 - 2) Precautionary measures

Personnel Training (cont'd)

E) Contingency Plan

- 1) Incident reporting
 - a) Operator's responsibilities
 - b) Supervisor's responsibilities
- 2) Safety requirements
- 3) Evacuation Plan
- 4) Incident response
 - a) Prevention
 - b) Spill containment and clean-up
- 5) Hazard description
- 6) Precautionary measures

F) Emergency Response

- 1) Simulated exercises
 - a) Practical examples
 - b) Recommended solutions

G) Acts, Agencies, Regulations, Penalties

H) Summary and Review

II Continuing Training - A yearly briefing given to all treatment plant operators, foremen, General Foremen and other associated personnel to review the original training course and add new material relating to regulations, specific wastes handled, and waste treatment practices and procedures. An outline of the yearly briefing follows:

- A) Company Environmental Policy
- B) Contingency Plan
- C) Emergency spill procedures

Operator Training (cont'd)

- D) Evacuation Plan
- E) Inspection Schedule
- F) Incompatible Waste and Toxic Hazards

III Employees Trained

A) General Foremen

- 1) F. Dubay
- 2) E. Seidell
- 3) J. Sanders
- 4) F. Corbo

B) Foremen

- | | |
|------------------|-----------------|
| 1) L. Lucia | 7) J. Burch |
| 2) J. Eydenta | 8) J. Hurley |
| 3) N. Ramsdell | 9) S. Friedrich |
| 4) R. Keene | 10) G. Bloom |
| 5) A. Schmedding | 11) R. Lunn |
| 6) N. Picard | |

C) Treatment Plant Operators

- | | |
|----------------|-----------------|
| 1) J. Gregoire | 9) R. Callahan |
| 2) R. Blake | 10) A. Johnston |
| 3) J. Lusa | 11) J. O'Neill |
| 4) A. Brayton | 12) E. Edwards |
| 5) E. Rhodes | 13) R. Churney |
| 6) C. Walton | 14) R. Ives |
| 7) B. Staley | 15) D. Besaw |
| 8) J. Bull | |

D) Other Personnel

- 1) Charles Johnson - Lead Facilities Engineer
- 2) Patricia Walker - Industrial Waste Analyst
- 3) Thomas Evans - Maintenance Mechanic

Operator Training (cont'd)

IV Additional Personnel Training

A) Lead Facilities Engineer - Charles Johnson

- 1) Attended formal RCRA Training Seminars sponsored by
Lion Technology, Inc.

B) Chemical Engineer - William Chudzik

- 1) Attended formal RCRA Training Seminars sponsored by
Lion Technology Inc.
- 2) Frequently attends informational seminars held by
UTC Corporate Environmental Director and
Pratt & Whitney Legal Counsel.

V Future Training Plans

- A) All personnel will continue to receive yearly training
updates reviewing original material and adding any new
material resulting from changes in operation or
regulations.
- B) All new personnel will be given the original training
program, incorporating all yearly update sessions, within
the first six months of employment at the facility. Any
employee new to the facility will be supervised at all
times while working until completion of the training
program.

Operator Training (cont'd)

VI Records

- A) Records documenting job titles and descriptions, names of employees, and completed training programs will be kept on site in a permanent file in the Maintenance Department Office. A certificate of completion of training is awarded to each employee successfully completing the initial training course and yearly course reviews, and the certificate becomes a part of the employee's personnel file. Copies of the certificate are shown as Exhibit L.

VII Job Descriptions

- A) Job descriptions for employees involved in the hazardous waste facility are included as Exhibits M thru U.

VIII Training Director

The Training Director is John Lyman who, for the last nine years, has been responsible for the technical training programs for the Pratt & Whitney Manufacturing Division. He receives his input for the training program, "Handling of Hazardous Wastes", from the Chemical Engineer, the Lead Facilities Engineer, and the General Foreman of Maintenance. The Job Descriptions for these positions are Exhibits M, O, and R respectively.

SECTION - J - CLOSURE PLAN AND COST ESTIMATE

I Introduction

- A) The Company does not expect to close at any time in the future.
- B) In accordance with RCRA regulations all hazardous waste facilities will be closed in a manner that:
 - 1) Minimizes the need for further maintenance, and;
 - 2) Controls, minimizes or eliminates to the extent necessary, post closure release of hazardous wastes to groundwater, surface water or the atmosphere.
- C) In subsequent sections, this Closure Plan provides a description of general methods to be applied and precautions to be taken in closing hazardous waste facilities. Table J-1 lists the maximum waste inventory, options for ultimate or partial closure and a schedule for ultimate closure for the Concentrated Waste Treatment Plant. A summary of specific closure methods applicable to the various systems at this facility are described in detail. Trackable closure timetables are presented in Table J-2. Detailed breakdowns of the closure costs estimates for each portion of the treatment, storage or disposal facility are available in Tables J-3, J-4, and J-5. The total cost estimate for the entire facility is summarized in Table J-6.

II General Closure Plan Requirements

- A) The following general information applies to all plans:
 - 1) Personal Health and Safety - The decontamination crew will consist of a minimum of two individuals who will be adequately clothed, including self-contained breathing apparatus, if

required, and coveralls. Supervision of the decontamination process will include the individual(s) responsible for operation of the TSDF.

- 2) Sudden or Non-Sudden Release, or Fire Hazard - The decontamination process will be considered as an activity presenting a high risk potential for release of hazardous waste or fire/explosion hazard. As such, the appropriate mechanisms of the Contingency Plan will be readily available for activation.

III Amending of Closure Plan

P&W will amend the closure plan whenever changes in operating plans or facility design affect the closure plan, or whenever there is a change in the expected year of closure. If a request for permit modification is made to authorize a change in operating plans or facility design, P&W will also request modifying the closure plan at the same time. If a permit modification is not needed to authorize the change in operating plans or facility design, P&W will make a request for modification of the closure plan within 60 days after the change in plans or design occurs.

TABLE J-1

CLOSURE PLAN SUMMARY

CWTP

EAST HARTFORD, CONNECTICUT

<u>ITEM</u>	<u>PROCESS</u>	<u>PROCESS CODE</u>	<u>MAXIMUM INVENTORY*</u>	<u>CLOSURE OPTIONS PARTIAL/ULTIMATE</u>	<u>SCHEDULE FOR ULTIMATE CLOSURE START**/COMPLETE</u>		<u>METHOD (SEE SECTION REFERENCE)</u>
1	Barrel Storage	S01	47,520 Gal.	X	January	June	V
2	Transporter Storage	S01	9,000 Gal.	X	January	June	V
3	Barrel/Transporter	S01	4,840 Gal.	X	January	June	V
4.	Tank Storage (CWT Area)	S02	27,300 Gal.	X	January	June	III
5.	Incinerator	T03	900 Gal.	X	April	Sept.	IV

* For continuous processes, one maximum volume of units is reported.

** Assumed start date. Completion date based on estimated time of performance of closure.

Closure Plans (cont'd)

3) Scheduling - The closure schedule provides for sequencing the closures so that hazardous residuals may be treated on-site to the maximum extent practical. Thus, the six month closure periods indicated in Table J-1 overlap and encompass a total of one year of calendar time.

4) Partial Closure - Partial closure potential for all facilities has been noted on Table J-1. The procedures described for ultimate closure would be followed for partial closure.

5) Certification - The following certification should be submitted to the EPA Region I Administrator upon completion of closure:

"I, _____, for Pratt & Whitney Group,

(Name)

United Technologies Corporation, owner and operator of _____, a hazardous waste TSDF and I,

(Site)

_____, P. E., employed by _____,

(Name)

(Firm)

certify by means of our signatures, that the facility named above has been closed in accordance with the method specified by the Closure Plan, and attached hereto. Closure was completed on _____, after receiving the final volume of material

(Date)

on _____."

(Date)

PRATT & WHITNEY GROUP

P.E.

(Date)

Firm

Closure Plans (cont'd)

III Storage and Treatment Tanks

A) At the closure of storage and treatment tanks, all hazardous waste and residues will be removed from tanks, discharge control equipment, and discharge confinement structures. The following steps outline such a procedure:

- 1) Step 1 - Complete the final waste treatment or waste storage process in the normal manner. Shut off the inflow to the tank, using a permanent flow control device, such as a valve and remove its handwheel. Empty tank to next sequential process, tank or effluent pipeline, as appropriate. Use tank drain connection, if necessary, draining in the normal manner. Shut off outflow.
- 2) Step 2 - Select either water rinse or appropriate solvent for hazardous wastes which are not water soluble. Using hose eductor or other appropriate device, thoroughly rinse tank interior walls with water or solvent. Use temporary cover to prevent dispersion of airborne mist from open-top tanks.
- 3) Step 3 - Use portable mixer as necessary to ensure floating debris in tank remains in suspension.
- 4) Step 4 - Drain tank with use of a pump to barrels and dispose of as a hazardous waste by an appropriate vendor.
- 5) Step 5 - Use similar method to decontaminate exterior of tank, as necessary. Retain flush water in containment area; drain to barrels or drain line.

Closure Plans (cont'd)

- 6) Step 6 - Inspect tank interior and exterior for obvious holidays in the flushing process, and/or debris dislodged. Use physical prod from outside tank to dislodge material.
- 7) Step 7 - Rinse all surfaces with clean water or clean solvent. Collect samples. Perform tests specified in the Waste Analysis Plan for a new waste. For the tank interior, collect one composite sample; for the exterior, collect one composite sample.
- 8) Step 8 - If the results of the waste analysis indicate that the rinse water or rinse solvent is a hazardous waste, dispose of rinse as a hazardous waste by an appropriate vendor, and repeat Steps 2-7 above until rinse is non-hazardous.
- 9) Step 9 - If sequential processes are involved, the rinsing and testing process should be carried out in the sequence of plant flow. If the tanks are connected by means of pipe or channels, the rinsing and testing process should include these interconnections.

IV Incinerator

- A) At closure of incinerators, hazardous wastes and residues (including ash) must be removed from the thermal treatment process or equipment. The following steps outline such a procedure:

- 1) Step 1 - Complete the final waste treatment process in the normal manner. Shut off and disconnect the inflow to the tank.

Closure Plans (cont'd)

- 2) Step 2 - Continue operation of the unit, using auxiliary fuel oil only, for 30 minutes, or until stack gas monitoring equipment shows concentrations of combustion products to be the same as those resulting from combustion of pure auxiliary fuel.
- 3) Step 3 - Empty all related tanks (scrubber water makeup tank, etc.) to the next sequential process, tank, or effluent pipeline as appropriate. Use tank drain connections, if necessary, draining in the normal manner. Isolate tanks.
- 4) Step 4 - Conduct tank closure operations as outlined below:
 - a) Remove any residue and ash (if present) from incinerator and test to determine if they are a hazardous waste. If hazardous, dispose of in a secure chemical landfill.
 - b) Select either rinse or appropriate solvent, for hazardous wastes which are not water soluble. Using hose eductor or other appropriate device, thoroughly rinse tank interior walls with water or solvent. Use temporary cover to prevent dispersion of airborne mist.
 - c) Use portable mixer in tank as necessary to ensure floating debris in tank remains in suspension.
 - d) Drain tank in the normal manner.

Closure Plan (Cont'd)

- e) Use similar method to decontaminate exterior of tank, if necessary. Retain flush water in containment area; drain to barrels or drain line.
- f) Inspect tank interior and exterior for obvious holidays in the flushing process and/or debris not dislodged. Use physical prod from outside tank to dislodge material.
- g) Rinse all surfaces with clean water or clean solvent. Collect samples. Perform tests specified in the Waste Analysis Plan for a new waste.
- h) If the results of the waste analysis indicate that the rinse water or rinse solvent is a hazardous waste, dispose of rinse in an appropriate manner, and repeat Steps a-g above until rinse is non-hazardous.
- i) If sequential processes are involved, the rinsing and testing process should be carried out in the sequence of plant flow. If the tanks are connected by means of pipe or channels, the rinsing and testing process should include these interconnections.

Closure Plan (Cont'd)

V Container Storage Areas (Items 1, 2, and 3, Table J-1)

A) There are no additional closure requirements for the container storage areas, besides those outlined in Section I of this plan. Proper procedures for closing such facilities will incorporate the following steps:

- 1) Step 1 - Remove all stockpiled containerized wastes.
- 2) Step 2 - Water rinse container storage containment area. Pump wash water to containers. Collected water should be tested and, if hazardous, hauled to a permitted facility for disposal.
- 3) Step 3 - Repeat Step 2, if necessary or until wash water exhibits non-hazardous concentrations.
- 4) Step 4 - Rinse detention basin and pump wash water to containers. Collected waste should be tested and, if hazardous, hauled to a permitted facility for disposal.
- 5) Step 5 - Repeat Step 4 as necessary.

VI Cost Estimates

A) Closure costs in Fall 1980 dollars are shown in Table J-3 through J-6. Cost estimates are based on 1) in-house labor @ \$200/Man Day and 2) transport and treatment of 55 gallon drum @ \$100/ea. All other costs are based on "Means 1980 Cost Data."

B) Closure cost estimate yearly revisions can be found in Table J-7.

Closure Plan (Cont'd)

TABLE J-2

CLOSURE TIMETABLE		ESTIMATED TIME TO <u>COMPLETE STEPS</u>	<u>TOTAL TIME</u>
ITEM 1	CONTAINER STORAGE		
	Step 1	2 months	2 months
	Steps 2 - 3	2 months	4 months
	Steps 4 - 5 and certification	2 months	6 months
ITEM 2	TANK STORAGE		
	Step 1	1 month	1 month
	Steps 2 - 5	2 months	3 months
	Steps 6 - 8 and certification	3 months	6 months
ITEM 3	INCINERATOR		
	Step 1	1 month	1 month
	Steps 2 - 3	1 month	2 months
	Step 4 a-e	2 months	4 months
	Step 4 f-i and certification	2 months	6 months

Closure Plan (Cont'd)

TABLE J-3

CONTAINER STORAGE AREAS

Step 1 Removal of Containerized Wastes

A. Disposal - \$100/drum

864 drums barrel storage area	= \$ 86,400	
164 drums transporter storage area	= 16,400.) = 111,600 ? ←
88 drums barrel/transporter storage area	= 8,800.	
	\$135,200.	

B. Labor - \$200/Man.-day

= 14,300
Sub Total = \$125,900.

Steps 2 - 3 Rinsing

A. Disposal estimate 200 drums rinse water	= 20,000
B. Sampling/Analysis (100 drums @ \$100 each)	= 10,000
C. Labor	= 3,900
D. Equipment	= <u>1,000</u>
	Sub Total = \$ 34,900.

Steps 4 - 5 Decontamination

A. Labor	= 3,900
B. Testing, Analysis 10 samples @\$100 each	= 1,000
C. Certification	= <u>900</u>
	Sub Total = \$ 5,800

Closure Plan (Cont'd)

TABLE J-3

Closure Costs	= 166,600
Contingency @ 20%	= <u>33,320</u>
Estimated Total Cost	199,920

Round Value to \$200,000

Closure Plan (Cont'd)

TABLE J-4

TANK STORAGE AREA

Step 1 - Disposal of Bulk Liquids

- A. Disposal in bulk, assume \$1/gal

$$27,300 \text{ gal} \times \$1/\text{gal} = 27,300$$

- B. Labor-draining/disposing/disconnect = 9,000

$$\text{Sub Total} = \$ 36,300.$$

Steps 2-5 Rinse water/Rinse Solvent Procedures

- A. Disposal - assume 10% of total

$$27,300/55 \text{ gal} = 50 \text{ drums} \times \$100 \text{ each} = 5,000$$

- B. Labor - = 5,000

- C. Equipment - pump, solvents, misc = 1,400

$$\text{Sub Total} = \$ 11,400.$$

Steps 6-8 Decontamination

- A. Sampling/Analysis - 8 tanks

assume 2 samples/round/tank

$$\text{assume 2 rounds required} = 3,200$$

@ \$100/each

- B. Disposal - assume 2 drums/tank = 1,600

- C. Labor = 5,000

- D. Certification = 500

$$\text{Sub Total} = \$ 10,300.$$

Closure Plan (Cont'd)

TABLE J-4

Closure Cost	= 58,000
Contingency @ 20%	= 11,600
Total Closure Cost Estimate	= 69,600

ROUND VALUE TO = \$70,000

Closure Plan (Cont'd)

TABLE J-5

INCINERATOR

Steps 1 - 3 Operations Completion

A. Disposal of liquids - 5 drums @ 100 each	= 1,000
B. Labor	= <u>3,000</u>
Sub Total = \$ 4,000	

Step 4 (a) Removal of Ash and Residue

A. Testing - 10 samples @ \$100 each	= 1,000
B. Labor	= 1,000
C. Disposal - 5 drums	= <u>500</u>
Sub Total = \$ 2,500	

Step 4 (b-f) Rinsing Procedures

A. Testing - 10 samples @ \$100 each	= 1,000
B. Labor	= 3,000
C. Disposal - 5 drums	= 500
D. Equipment - pumps, solvents, misc	= <u>2,000</u>
Sub Total = \$ 6,500	

Step 4 (g-i) Final Decontamination

A. Testing - 10 samples @ \$100 each	= 1,000
B. Labor	= 2,000
C. Certification	= <u>600</u>
Sub Total = \$ 3,600.	

Closure Plan (Cont'd)

TABLE J-5

INCINERATOR (cont'd)

Closure Cost = \$ 16,600

Contingency @ 20% = \$ 3,320

Total Estimated Closure Cost = \$ 19,920

Round Value to \$20,000

Closure Plan (Cont'd)

TABLE J-6

CLOSURE COST SUMMARY

400 Main Street, East Hartford, Connecticut

<u>ITEM</u>	<u>PROCESS</u>	<u>CLOSURE ACTIVITIES</u>	ESTIMATE OF	
			ULTIMATE CLOSURE	<u>COST</u>
1	Container Storage S01	Container Removal/Equipment Decontamination	\$200,000	
2	Tank Storage S02 (CWT Area)	Liquid Removal/Equipment Decontamination	70,000	
3	Incineration T06	Liquid Removal/Equipment Decontamination	<u>20,000</u>	
				\$290,000

NOTE: The closure cost listed above is based on Fall 1980 dollars. Annually, these costs must be updated using the Annual Implicit Price Deflator for Gross National Product as published by the U.S. Department of Commerce, in its "Survey of Current Business".

Closure Plan (Cont'd)

CLOSURE PLAN COST ESTIMATE REVISIONS

VII Since the closure costs given in Table J-6 are based on Fall 1980 dollars, these costs must be updated annually, using the Annual Implicit Price Deflator for Gross National Product as published by the U.S. Department of Commerce in its "Survey of Current Business". The ratio of the Implicit Price Deflator for the current year to that of the previous year produces a factor which is multiplied by the closure cost estimate for an updated figure. The following Table will list the updated figures.

TABLE J-7

<u>YEAR</u>	<u>IMPLICIT PRICE DEFLATOR GNP</u>	<u>FACTOR</u>	<u>REVISION</u>
May 1981	177.36	-	\$290,000
May 1982	193.71/177.36	1.09	\$316,100
May 1983	207.15/195.51	1.06	\$335,066
May 1984	215.63/206.88	1.04	\$348,460

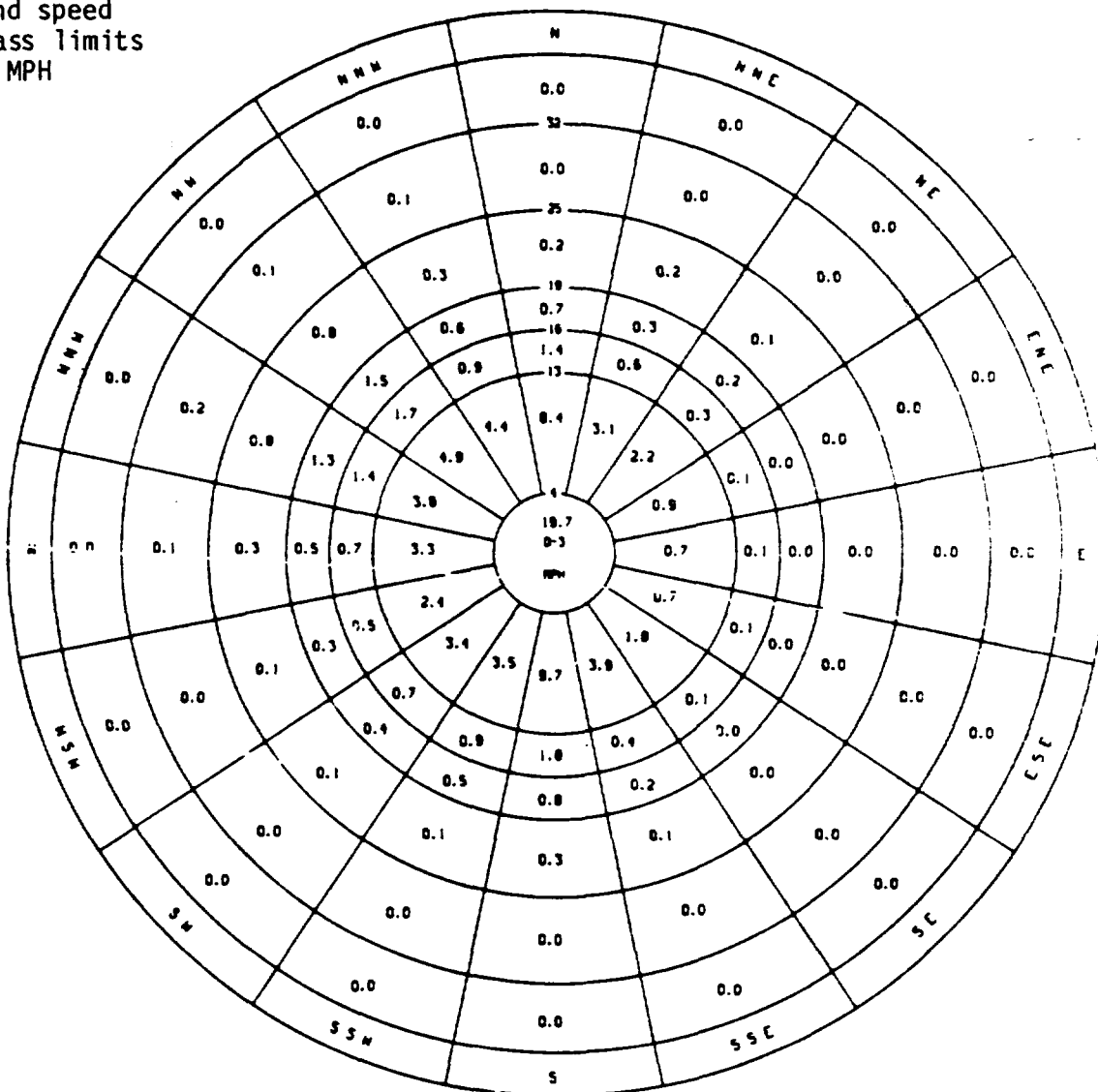
* Estimate based on data published in "Economic Indicators", 98th Congress, 1st Session, March, 1983.

SECTION - K - TOPOGRAPHIC MAP

The topographic maps - given on pages 88-89 show a minimum of 1000 feet surrounding the CWTP. The area included on these maps is shown as an insert in "Facility Location Map" shown in Exhibit A. In addition to general topography the map on page 88 shows site piping in the CWTP area and the map on page 89 shows the general traffic pattern of trucking on site. A more detailed site plan of the CWTP area is given in Exhibit AA.

The wind rose below was obtained from the National Climatic Center, Asheville, North Carolina.

Wind speed
class limits
in MPH



**US EPA New England
RCRA Document Management System
Image Target Sheet**

RDMS Document ID # 2448

Facility Name: PRATT & WHITNEY - MAIN STREET

Facility ID#: CTD990672081

Phase Classification: R-1B

Purpose of Target Sheet:

☒ **Oversized (in Site File)** ☐ **Oversized (in Map Drawer)**

☐ **Page(s) Missing (Please Specify Below)**

☐ **Privileged** ☐ **Other (Provide
Purpose Below)**

Description of Oversized Material, if applicable:

EXHIBIT A: TOPOGRAPHIC MAP OF CWTP-PAGE 88

☒ **Map** ☐ **Photograph** ☐ **Other (Specify Below)**

-

*** Please Contact the EPA New England RCRA Records Center to View This Document ***

**US EPA New England
RCRA Document Management System
Image Target Sheet**

RDMS Document ID # 2448

Facility Name: PRATT & WHITNEY - MAIN STREET

Facility ID#: CTD990672081

Phase Classification: R-1B

Purpose of Target Sheet:

☒ **Oversized (in Site File)** ☐ **Oversized (in Map Drawer)**

☐ **Page(s) Missing (Please Specify Below)**

☐ **Privileged** ☐ **Other (Provide
Purpose Below)**

Description of Oversized Material, if applicable:

EXHIBIT AA: TOPOGRAPHIC MAP OF CWTP-PAGE 89

☒ **Map** ☐ **Photograph** ☐ **Other (Specify Below)**

-

*** Please Contact the EPA New England RCRA Records Center to View This Document ***

SECTION - L - FINANCIAL ASSURANCE AND LIABILITY INSURANCE

The following financial documentation is contained in this section:

- I - A letter from UTC's Environmental Compliance Manager Fred Norton transmitting financial documentation to the DEP, dated October 14, 1985.
- II - A letter from UTC's chief financial officer S. B. Brown, Executive Vice President - Finance and Administration, dated October 1, 1985.
- III - Exhibit A: UTC Hazardous Waste Management Facility Closure and Post-Closure Costs by State, dated October 18, 1984.
- IV - A special report by Price Waterhouse, independent certified public accountant, dated October 2, 1985.
- V - A certificate of liability insurance from Liberty Mutual dated October 1, 1985.

The United Technologies 1984 Annual Report, including our independent certified public accountant's report on examination, which is referenced in the above material, is included in Appendix II of this application.

14 October 1985

CERTIFIED MAIL

Connecticut Department of
Environmental Protection
Hazardous Waste Management Section
165 Capitol Avenue
Hartford, CT 06106

Attention: Financial Documentation Enclosed

Dear Sir:

Enclosed please find United Technologies Corporation (UTC) hazardous waste management facility Financial Requirements submitted under your state hazardous waste management regulations for the following facilities. This financial assurance submittal revises the 20 May 1985 document sent previously to your attention.

CTD000844399, Pratt & Whitney, Colt St., East Hartford
CTD990672081, Pratt & Whitney, Main St., East Hartford
CTD000845131, Pratt & Whitney, Pent Rd., East Hartford
CTD000844324, Pratt & Whitney, Manchester
CTD003935905, Pratt & Whitney, Middletown
CTD001449511, Pratt & Whitney, North Haven
CTD000844407, Pratt & Whitney, Rocky Hill
CTD001149277, Pratt & Whitney, Aircraft Rd., Southington
CTD000844332, Pratt & Whitney, Newell St., Southington
CTD010166791, Power Systems, South Windsor
CTD001145341, Hamilton Standard, Windsor Locks
CTD089623318, Norden, Norwalk
CTD001449735, Sikorsky, Bridgeport
CTD001449784, Sikorsky, Stratford
CTD095532131, UT Research Center, East Hartford

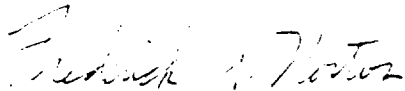
This evidence includes:

- A 1 October 1985 letter from UTC's chief financial officer S. B. Brown.

- Exhibit A: UTC Hazardous Waste Management Facility Closure and Post-Closure Care Costs by State dated 1 October 1985.
- UTC Annual Report 1984, including our independent certified public accountant's report on examination.
- A special report by Price Waterhouse, independent certified public accountant.

Please do not hesitate to contact me if additional information is needed to evidence UTC's compliance with your Financial Requirements.

Respectfully submitted,



Frederick S. Norton
Environmental Compliance Manager

FSN/mlw
Enclosures



RCRA Part B Permit Application
United Technologies
Pratt & Whitney
CTD 990672081

United Technologies Building
Hartford, Connecticut 06101
203 / 728-7000

REVISED Page 93 of 212
December 4, 1985

1 October 1985

Connecticut Department of
Environmental Protection
Hazardous Waste Management Section
165 Capitol Avenue
Hartford, CT 06106

Attention: Financial Documentation Enclosed

Dear Sir:

I am the chief financial officer of United Technologies Corporation, United Technologies Building, Hartford, CT 06101. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in Subpart H of 40 CFR Parts 264 and 265.

1. This firm is the owner or operator of the following facilities which are located in the State of Connecticut for which financial assurance for closure or post-closure care is demonstrated through the financial test specified in Subpart H of 40 CFR Parts 264 and 265. The current closure and/or post-closure cost estimates covered by the test are shown for each facility:

See Exhibit A attached hereto. Facilities of the Corporation are designated "division."

2. This firm guarantees, through the corporate guarantee specified in Subpart H of 40 CFR Parts 264 and 265, the closure or post-closure care of the following facilities owned or operated by subsidiaries of this firm. The current cost estimates for the closure or post-closure care so guaranteed are shown for each facility:

See Exhibit A attached hereto. Facilities of subsidiaries are designated "subsidiary."

3. In states where EPA is not administering the financial requirements of Subpart H of 40 CFR Parts 264 or 265, this firm, as owner or operator or guarantor, is demonstrating financial

-2-

assurance for the closure or post-closure care of the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR Parts 264 and 265. The current closure and/or post-closure cost estimates covered by such a test are shown for each facility:

For the following states, see Exhibit A for a list of facilities in:

California
Colorado
Florida
Indiana
Maine
Michigan
Mississippi
New Jersey
Texas

4. This firm is the owner or operator of the following hazardous waste management facilities for which financial assurance for closure or, if a disposal facility, post-closure care, is not demonstrated either to EPA or a State through the financial test or any other financial assurance mechanism specified in Subpart H of 40 CFR Parts 264 and 265 or equivalent or substantially equivalent State mechanisms. The current closure and/or post-closure cost estimate not covered by such financial assurance is shown for this facility: NONE.

This firm is required to file a Form 10-K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December, 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed fiscal year, ended December 31, 1984.

-3-

ALTERNATIVE II

1. Sum of current closure and post-closure cost estimates	\$8,103,341
2. Current bond rating of most recent issuance	Aa3
Name of rating service	Moody's
3. Date of issuance of bond	Jan. 15, 1985
4. Date of maturity of bond	Jan. 15, 1992
*5. Tangible net worth	\$3,584,886,000
*6. Total assets in U.S.	\$7,345,293,000
7. Is line 5 at least \$10 million?	Yes
8. Is line 5 at least 6 times line 1?	Yes
*9. Are at least 90% of the firm's assets located in the U.S.?	No
10. Is line 6 at least 6 times line 1?	Yes

I hereby certify that the wording of this letter is identical to the wording specified in 40 CFR 264.151(f) (except that references to EPA have been changed to the State of Connecticut) as such regulations were constituted on the date shown immediately below.



Stillman B. Brown
Executive Vice President -
Finance and Administration and
Chief Financial Officer
United Technologies Corporation
Date: October 1, 1985

EXHIBIT A

1 October 1985
Revised by FSN

UNITED TECHNOLOGIES CORPORATION
HAZARDOUS WASTE MANAGEMENT FACILITY BY STATE
CLOSURE AND POST-CLOSURE CARE COSTS INFLATED TO 20 MAY 1985
AND REVISED AS NECESSARY 1 OCTOBER 1985

(RCRA Parts 264 and 265 Subpart H)

Key:

STATE WITH UTC FACILITY(IES)

1. U.S. EPA Identification Number
2. Facility Name
3. Address
4. Authorized State agency or U.S. EPA Region
5. Type of Facility or U.S. EPA Region
6. 19 May 1981 Closure/Post-Closure
Cost (in 1981 dollars)
7. 19 May 1982 Adjusted Closure/Post-Closure
Cost (1.09 x 1981 cost)
8. 19 May 1983 Adjusted Closure/Post-Closure
Cost (1.06 x 1982 cost)
9. 19 May 1984 Adjusted Closure/Post-Closure
Cost (1.04 x 1983 cost)
10. 19 May 1985 Adjusted Closure/Post-Closure
Cost (1.04 x 1984 cost) with 1 October 1985
Revisions

--- CLOSURE COSTS ---

CALIFORNIA

1. CAD044433613
2. Hamilton Standard HSS O&R Facility (Division)
3. 4401 Donald Douglas Drive
Long Beach, CA 90808
4. Department of Health Services
5. Storage
6. \$4,000
7. \$4,360
8. \$4,622
9. \$4,807
10. \$4,999

1. CAD001705235
2. Chemical Systems Division/Coyote Center (Division)
3. 600 Metcalf Road
San Jose, CA 95138
4. DHS
5. Storage and treatment (includes surface impoundments)
6. \$165,000
7. \$360,000 (revised to 19 May 1983 dollars)
8. \$360,000
9. \$374,400
10. \$592,000 (revised 1 October 1985)
(Also see Pg. 9 for post closure cost at this site)

COLORADO

1. COD000716597
2. Mostek Corporation (Subsidiary)
3. 1575 Garden of the Gods Road
Colorado Springs, CO 80907
4. Region VIII
5. Storage
6. \$14,360
7. \$19,632 (revised to 19 May 1983 dollars)
8. \$38,000 (revised November 1983)
9. \$39,520
10. \$41,101

CONNECTICUT

1. CTD000844399
2. Pratt & Whitney Aircraft Group (Division)
3. Colt Street
East Hartford, CT 06108
4. Department of Environmental Protection
5. Storage and treatment (includes surface impoundments)
6. \$100,000
7. \$109,000
8. \$115,540
9. \$120,162
10. \$124,968

1. CTD990672081
2. Pratt & Whitney Aircraft Group (Division)
3. 400 Main Street
East Hartford, CT 06108
4. DEP
5. Storage and treatment
6. \$290,000 revised
7. \$316,100 revised
8. \$335,066 revised
9. \$348,469 revised
10. \$362,408

1. CTD000845131
 2. Pratt & Whitney Aircraft Group (Division)
 3. Pent Road (Willgoos)
East Hartford, CT 06108
 4. DEP
 5. Storage
 6. \$3,000
 7. \$3,270
 8. \$3,466
 9. \$3,605
 10. \$3,749
-
1. CTD000844324
 2. Pratt & Whitney Aircraft Group (Division)
Pine Street
Manchester, CT 06040
 4. DEP
 5. Storage
 6. \$4,500
 7. \$4,905
 8. \$5,199
 9. \$5,407
 10. \$5,623
-
1. CTD003935905
 2. Pratt & Whitney Aircraft Group (Division)
 3. Aircraft Road
Middletown, CT 06457
 4. DEP
 5. Storage and disposal (includes surface impoundments)
 6. \$ 280,000
 7. \$ 305,200
 8. \$ 323,512
 9. \$ 977,080 (revised)
 10. \$1,688,004 (revised 1 October 1985)
(Also, see page 9 for post-closure cost at this site)
-
1. CTD001449511
 2. Pratt & Whitney Aircraft Group (Division)
 3. 415 Washington Avenue
North Haven, CT 06473
 4. DEP
 5. Storage (includes surface impoundments)
 6. \$480,000
 7. \$523,200
 8. \$554,592
 9. \$584,982 (revised)
 10. \$608,381

1. CTD000844407
2. Pratt & Whitney Aircraft Group (Division)
3. Dividend Road
Rocky Hill, CT 06067
4. DEP
5. Storage
6. \$ 1,000
7. \$ 1,090
8. \$ 1,155
9. \$11,400 (revised)
10. \$11,856

1. CTD001149277
2. Pratt & Whitney Aircraft Group (Division)
3. Aircraft Road
Southington, CT 06489
4. DEP
5. Storage (includes surface impoundments)
6. \$60,000
7. \$65,400
8. \$69,324
9. \$72,097
10. \$74,981

1. CTD000844332
2. Pratt & Whitney Aircraft Group (Division)
3. Newell Street (Service Center)
Southington, CT 06489
4. DEP
5. Storage (includes surface impoundments)
6. \$115,000
7. \$125,350
8. \$132,871
9. \$138,186
10. \$143,713

1. CTD010166791
2. International Fuel Cell (Division)
3. P.O. Box 739
South Windsor, CT 06070
4. DEP
5. Storage and treatment
6. \$6,450
7. \$7,031
8. \$7,453
9. \$7,751
10. \$8,061

1. CTD001145341
 2. Hamilton Standard Complex B-1, 2 and 3 (Division)
 3. Hamilton Road
Windsor Locks, CT 06096
 4. DEP
 5. Storage and treatment (includes surface impoundments)
 6. \$580,000
 7. \$632,200
 8. \$670,132
 9. \$696,937
 10. \$724,814
(Also see Page 10 for post-closure cost at this site)
1. CTD089623318
 2. Norden Systems (Subsidiary)
 3. Norden Place
Norwalk, CT 06856
 4. DEP
 5. Storage and treatment
 6. \$12,250
 7. \$13,353
 8. \$14,154
 9. \$14,720
 10. \$15,309
1. CTD001449735
 2. Sikorsky Aircraft Bridgeport Plant (Division)
 3. South Avenue
Bridgeport, CT 06604
 4. DEP
 5. Storage
 6. \$17,000
 7. \$18,530
 8. \$19,642
 9. \$20,428
 10. \$21,245
1. CTD001449784
 2. Sikorsky Aircraft (Division)
 3. North Main Street
Stratford, CT 06602
 4. DEP
 5. Storage and treatment (includes surface impoundments)
 6. \$145,000
 7. \$158,050
 8. \$167,533
 9. \$174,234
 10. \$181,203
(Also see Page. 9 for post-closure cost at this site)

- 6 -

1. CTD095532131
2. United Technologies Research Center (Division)
3. Silver Lane
East Hartford, CT 06108
4. DEP
5. Storage
6. \$10,000
7. \$10,900
8. \$11,554
9. \$12,016
10. \$12,497

FLORIDA

1. FLD001447952
2. Pratt & Whitney Aircraft (Division)
3. P.O. Box 2691
West Palm Beach, FL 33402
4. Department of Environmental Regulation
5. Storage and treatment
6. \$533,000 (revised)
7. \$580,970 (revised)
8. \$615,828 (revised)
9. \$596,437 (revised)
10. \$620,294

INDIANA

1. IND000816108
 2. Components Division/Columbia City, Division of Essex Group,
Inc. and part of UTC Automotive Group (Subsidiary)
 3. P.O. Box 1500
Fort Wayne, IN 46801
 4. EMB
 5. Storage and treatment
 6. \$66,000
 7. \$71,940
 8. \$76,256
 9. \$79,306
 10. \$82,478
-
1. IND061561775
 2. Components Division/Jeffersonville, Division of Essex Group,
Inc. and part of UTC Automotive Group (Subsidiary)
 3. P.O. Box 808
Jeffersonville, IN 47130
 4. EMB
 5. Storage and treatment
 6. \$3,000
 7. \$3,270
 8. \$3,466
 9. \$3,605
 10. -0- (revised 1 October 1985 due to reclassification)

MAINE

1. MED000791681
2. Pratt & Whitney Aircraft Group (Division)
3. P.O. Box 455
North Berwick, ME 03906
4. Department of Environmental Protection
5. Storage
6. \$60,000
7. \$40,000 (revised)
8. \$42,400
9. \$112,000 (revised)
10. \$116,480

MICHIGAN

1. MID001868538
2. Inmont Corporation (Subsidiary)
3. 5935 Milford Avenue
Detroit, MI 48210
4. DNR
5. Storage
6. \$34,890
7. \$38,030
8. \$40,312
9. \$41,924
10. \$43,601

MISSISSIPPI

1. MSD004010724
2. American Bosch Electrical Products, Division of
Ambac Industries, Inc. (Subsidiary)
3. P.O. Box 2228
Columbus, MS 39701
4. Department of Natural Resources
5. Storage
6. \$20,000 (revised)
7. \$21,800
8. \$23,108
9. \$24,032
10. \$24,993

NEW JERSEY

1. NJD082988056
2. Inmont Corporation (Subsidiary)
3. James Street
Belvidere, NJ 07823
4. BHWM
5. Storage
6. \$21,714
7. \$23,668
8. \$25,088
9. \$26,092
10. \$27,136 -

1. NJD002444958
2. Inmont Corporation (Subsidiary)
3. L-5 Factory Lane
Bound Brook, NJ 08805
4. BHWM
5. Storage
6. \$27,170
7. \$29,615
8. \$31,392
9. \$32,648
10. \$33,954

1. NJD002165371
2. Inmont Corporation (Subsidiary)
3. 150 Wagaraw Road
Hawthorne, NJ 07506
4. BHWM
5. Storage
6. \$16,170
7. \$17,625
8. \$18,683
9. \$19,430
10. \$20,207

TEXAS

1. TXD047830443 (Texas TDWR Registration Number 30362)
2. Mostek Corporation (Subsidiary)
3. 1215 West Crosby Road
Carrollton, TX 75006
4. Department of Water Resources
5. Storage and treatment
6. \$100,000
7. \$109,000
8. \$115,540
9. \$120,162
10. \$124,968

--- POST-CLOSURE COST ---

CALIFORNIA

1. CAD001705235
2. Chemical Systems Division/Coyote Center (Division)
3. 600 Metcalf Road
San Jose, CA 95138
4. DHS
5. Surface Impoundments
6. -
7. -
8. -
9. -
10. \$1,572,000
(Also see Pg. 2 for closure cost on this site)

CONNECTICUT

1. CTD003935905
2. Pratt & Whitney Aircraft Group (Division)
3. Aircraft Road
Middletown, CT 06457
4. DEP
5. Disposal (includes a landfill)
6. \$570,000 (revised)
7. \$621,300 (revised)
8. \$658,578 (revised)
9. \$684,921 (revised)
10. \$712,318
(Also, see page 3 for closure cost at this site)

1. CTD001449784
2. Sikorsky Aircraft (Division)
3. North Main Street
Stratford, CT 06602
4. DEP
5. Surface Impoundments
6. -
7. -
8. -
9. -
10. \$ 70,000
(Also see Pg. 5 for closure cost on this site)

- 10 -

1. CTD001145341
2. Hamilton Standard Complex B-1, 2 and 3 (Division)
3. Hamilton Road
Windsor Locks, CT 06096
4. DEP
5. Surface Impoundments
6. -
7. -
8. -
9. -
10. \$ 30,000
(Also see Page 5 for closure cost at this site)

- 11 -

TOTAL: UNITED TECHNOLOGIES CORPORATION

SUB-TOTAL Closure Costs:

1. Number of Facilities: = 28
10. Sub-Total 1 October 1985 Closure Costs: = \$5,719,023

SUB-TOTAL Post Closure Costs:

- 1. Number of Facilities: = (4)
10. Sub-Total 1 October 1985 Post-Closure Cost: = \$2,384,318

TOTAL Closure and Post-Closure Costs:

1. Number of Facilities: = 28
10. TOTAL 1 October 1985 COSTS: = \$8,103,341

Price Waterhouse



October 2, 1985

To the Board of Directors of
United Technologies Corporation

We have examined the consolidated financial statements of United Technologies Corporation and subsidiaries (the "Corporation") as of December 31, 1984 and for the year then ended and have issued our report thereon dated January 23, 1985. We have not examined any financial statements of the Corporation as of any date or for any period subsequent to December 31, 1984.

Reference is made to the letter dated October 1, 1985 to the Connecticut Department of Environmental Protection from Mr. Stillman B. Brown, Executive Vice President - Finance and Administration and Chief Financial Officer of United Technologies Corporation (the "Letter"). We have compared the amounts listed below and included in the Letter to the corresponding amounts included in the aforementioned consolidated financial statements and found such amounts to be in agreement.

<u>Description</u>	<u>Amount (000's)</u>
Tangible net worth at December 31, 1984	\$ 3,584,886 (1)
Total assets in U.S. at December 31, 1984	7,345,293 (2)
(1) Shareowners' Equity, \$4,169,450; less Deferred Charges, \$584,564.	
(2) United States operations, \$7,095,170; plus General corporate assets and other, \$250,123.	

Because the foregoing procedure does not constitute an examination made in accordance with generally accepted auditing standards, we do not express an opinion on the amounts listed above. In connection with this procedure, no matters came to our attention that caused us to believe that the amounts should be adjusted.

October 2, 1985

We performed no audit or other procedures with respect to the amount shown in the Letter for current closure and post-closure cost estimates. Accordingly, we do not express an opinion or any other form of assurance on such amount.

It is understood that this report is solely for your information and assistance in complying with the requirements of the Environmental Protection Agency - Subpart H of 40 CFR, Parts 264 and 265 and the regulations of authorized states, and should not be used for any other purpose.

Yours very truly,

Pier Waterhouse

RCRA Part B Permit Application
United Technologies
Pratt & Whitney
CTD 990672081

Page 109 of 212
March 22, 1985

LIABILITY INSURANCE

RCRA Part B Permit Application
United Technologies
Pratt & Whitney Aircraft
CTD 990672081

This is to Certify that

UNITED TECHNOLOGIES CORPORATION, ETAL
C/O R.G. Hugel, Assistant Treasurer
United Technologies Building
Hartford, Connecticut 06101

**LIBERTY
MUTUAL**



Name and Page 110 of 212
address of March 22, 1985
Insured.

is, at the date of this certificate, insured by the Company under the policy(ies) listed below. The insurance afforded by the listed policy(ies) is subject to all their terms, exclusions and conditions and is not altered by any requirement, term or condition of any contract or other document with respect to which this certificate may be issued.

TYPE OF POLICY		EXPIRATION DATE	POLICY NUMBER	LIMITS OF LIABILITY		
WORKERS' COMPENSATION				COVERAGE AFFORDED UNDER W.C. LAW OF FOLLOWING STATES	LIMIT OF LIABILITY-COV. B (Indicate Limit for each state)	
				MARITIME COVERAGE-FOLLOWING STATES	LIMIT OF LIABILITY MARITIME COVERAGE	
GENERAL LIABILITY	<input checked="" type="checkbox"/> COMPREHENSIVE FORM <input type="checkbox"/> SCHEDULE FORM	CONTINUOUS	RG1-612-004136-24	BODILY INJURY		PROPERTY DAMAGE
				EACH OCCURRENCE \$	EACH OCCURRENCE \$	
				AGGREGATE \$	AGGREGATE \$	
	COMBINED SINGLE LIMIT BODILY INJURY AND PROPERTY DAMAGE					
				\$1,000,000 EACH OCCURRENCE		
				\$2,000,000 AGGREGATE		
AUTOMOBILE LIABILITY	<input type="checkbox"/> OWNED <input type="checkbox"/> NON-OWNED <input type="checkbox"/> HIRED			\$	EACH PERSON EACH ACCIDENT OR OCCURRENCE \$	EACH ACCIDENT OR OCCURRENCE \$
				\$	EACH ACCIDENT SINGLE LIMIT-B.I. AND P.D. COMBINE	
				\$		
OTHER						

LOCATION S OF OPERATIONS & JOB # (If Applicable)

DESCRIPTION OF OPERATIONS

SEE EXHIBIT A

NOTICE OF CANCELLATION: (NOT APPLICABLE UNLESS A NUMBER OF DAYS IS ENTERED BELOW) BEFORE THE STATED EXPIRATION DATE THE COMPANY CANCEL OR REDUCE THE INSURANCE AFFORDED UNDER THE ABOVE POLICIES AT LEAST 60 DAYS NOTICE OF SUCH CANCELLATION OR REDUCTION HAS BEEN GIVEN TO

CONNECTICUT DEPARTMENT OF ENVIRONMENTAL
PROTECTION
Hazardous Waste Management Section
165 Capitol Avenue
Hartford, Connecticut 06106

Mari Stenlund
AUTHORIZED REPRESENTATIVE
September 16, 1982 Glastonbury, CT
DATE ISSUED OFFICE



United Technologies Building
Hartford, Connecticut 06101
203/728-7000

A Part B Permit Application
United Technologies
Pratt & Whitney
CTD 990672081

Page 111 of 212
REVISED December 4, 1985

6 November 1985

CERTIFIED MAIL

Connecticut Department of
Environmental Protection
Hazardous Waste Management Section
165 Capitol Ave
Hartford, CT 06106

Attention: Financial Documentation Enclosed

Dear Sir:

Enclosed please find our revised Certificate of Pollution
Liability Insurance for the following UTC facilities:

CTD000844399, Pratt & Whitney, Colt St., East Hartford
CTD990672081, Pratt & Whitney, Main St., East Hartford
CTD003935905, Pratt & Whitney, Middletown
CTD001449511, Pratt & Whitney, North Haven
CTD001149277, Pratt & Whitney, Aircraft Rd., Southington
CTD000844332, Pratt & Whitney, Newell St., Southington
CTD001145341, Hamilton Standard, Windsor Locks
CTD001449784, Sikorsky, Stratford

Please do not hesitate to contact me if additional information is
needed to evidence UTC's compliance with your financial
requirements.

Respectfully submitted,

A handwritten signature in cursive script that reads "Fred S. Norton".

Fred S. Norton
Environmental Compliance Manager

mlw
Enclosures

HAZARDOUS WASTE FACILITY CERTIFICATE
OF POLLUTION LIABILITY INSURANCE

1. Liberty Mutual Insurance Company, the "Insurer", of 175 Berkeley Street, Boston, Massachusetts 02117, hereby certifies that it has issued liability insurance covering bodily injury and property damage to:

UNITED TECHNOLOGIES CORPORATION, the "Insured", of
ONE FINANCIAL PLAZA, HARTFORD, CONNECTICUT 06101

in connection with the insured's obligation to demonstrate financial responsibility under 40 CFR 264.147 OR 265.147. The coverage applies at:

<u>Name and Address of Each Facility</u>	<u>EPA Identification Number</u>
Pratt & Whitney Group Colt St., East Hartford, Ct 06108	CTD 000844399
Pratt & Whitney Group Aircraft Road, Middletown, CT 06457	CTD 003935905
Pratt & Whitney Group 415 Washington Ave., North Haven, CT 06473	CTD 001449511
Pratt & Whitney Group Aircraft Road, Southington, CT 06489	CTD 001149277
Pratt & Whitney Group Newell St. (Service Center), Southington, CT 06489	CTD 000844332
Hamilton Standard Complex B-1, 2 & 3 Hamilton Road, Windsor Locks, CT 06096	CTD 001145341
Sikorsky Aircraft North Main Street, Stratford, CT 06602	CTD 001449784
Pratt & Whitney Group 400 Main Street, East Hartford, CT 06108	CTD 990672081

for nonsudden accidental occurrences.

The limits of liability are: \$ 6,000,000 annual aggregate per site
\$ 3,000,000 each pollution incident
exclusive of legal defense costs.

The coverage is provided under policy number LWI-612-004136-494.

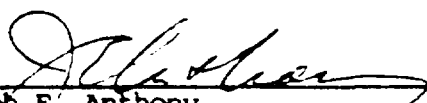
issued on (date) April 1, 1982.

The effective date of said policy is October 1, 1985.

2. The Insurer further certifies the following with respect to the insurance described in Paragraph 1:

- (a) Bankruptcy or insolvency of the insured shall not relieve the Insurer of its obligations under the policy.
- (b) The Insurer is liable for the payment of amounts within any deductible applicable to the policy, with a right of reimbursement by the insured for any such payment made by the Insurer. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated as specified in 40 CFR 264.147(f) or 265.147(f).
- (c) Whenever requested by the Commissioner of the Connecticut Department of Environmental Protection (DEP), the Insurer agrees to furnish to the Commissioner a signed duplicate original of the policy and all endorsements.
- (d) Cancellation of the insurance, whether by the Insurer or the Insured, will be effective only upon written notice and only after the expiration of sixty (60) days after a copy of such written notice is received by the Commissioner of the Department of Environmental Protection (DEP) in which the facilities are located.
- (e) Any other termination of the insurance will be effective only upon written notice and only after the expiration of thirty (30) days after a copy of such written notice is received by the Commissioner of the Connecticut Department of Environmental Protection (DEP) in which the facilities are located.

I hereby certify that the wording of this instrument is identical to the wording specified in 40 CFR 264.151(j) as such regulation was constituted on the date first above written, and that the Insurer is licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in one or more States.



Joseph E. Anthony
Assistant Vice President, Authorized Representative of

Liberty Mutual Insurance Company
20 Western Boulevard
Glastonbury, Connecticut 06033

RCRA Part B Permit Application
United Technologies
Pratt & Whitney
CTD 990672081

Page 114 of 212
March 22, 1985

PART II

SECTION - M - STORAGE OF CONTAINERS

I Description

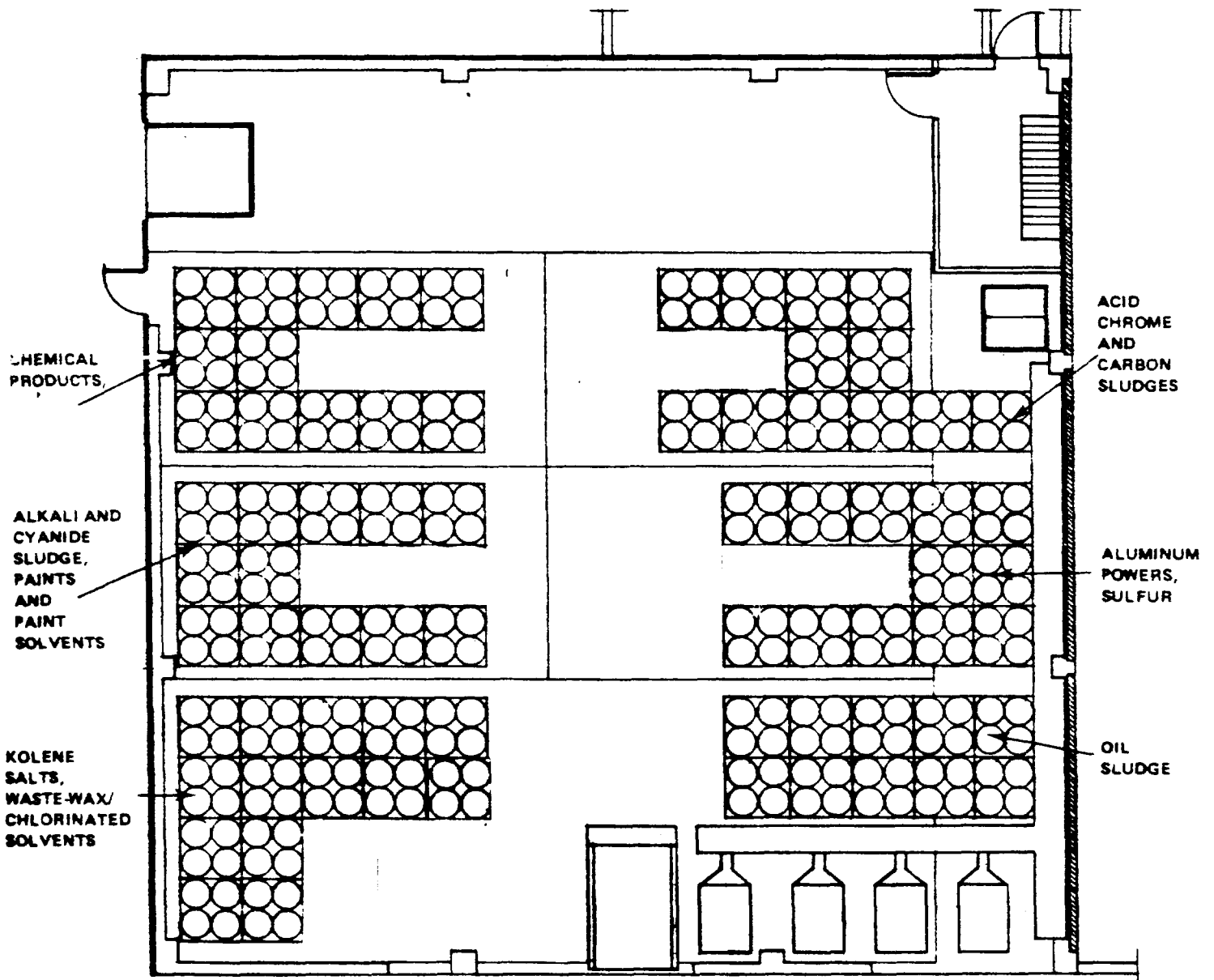
A) Container Storage Building

- 1) The building for container storage is 60' x 60', has a solid concrete floor, three walls and a roof. The floor of the building is divided into five compartments, each with a sloping floor to the center of the compartment where a 2' x 2' x 2.5' containment pit is installed under the floor.
- 2) Containers are either Specification 17E or 17H 55 gallon new or used steel drums. All drums meet DOT Specifications for the wastes that they contain. They are each fitted with a locking ring and sealing gasket that are employed when the container is filled. The containers are moved on pallets with a fork lift, the prongs of the fork lift fitting into the pallet. All containers are strapped and stored on pallets, and stored no more than three high. Only one type of waste is placed into each container. Once they are sealed they generally remain that way for disposal. The barrels are routinely inspected for leaks and proper stacking according to Inspection Guide M-566 described on page 31 of this document.
- 3) Each compartment is sloped to the center of the compartment to drain liquids to the center and into a containment pit under the floor. Barrels are elevated from the floor by storing on pallets.

Storage of Containers (Cont'd)

- 4) The sloped areas and submerged containment pits have a capacity of 1900 gallons. The storage building does not store more than 350 barrels of liquid since primary liquid storage is bulk tanks. The only liquids to be stored are paints and waxes and chemical products. Each of these is in a separate containment area is shown on Figure M-1 on the following page. The area with the wax/chlorinated solvents has a containment volume of 125 ft³ or 935 gallons (See Section IV, Containment Calculations). Applying a 10% containment volume for liquid waste, this area can accommodate 170 barrels of wax/chlorinated solvent waste. Both the area with the paints and the area with the Chemical Products have containment volumes of 32 ft³ allowing for storage of 43 barrels of each of these types of pure liquid wastes in each of these areas. Since the paint waste are approximately 70% liquid and 30% solid, up to 62 barrels of paint waste can be accommodated (See example analysis in Exhibit EE). Anything in excess of this amount can be stored with the waste wax/chlorinated solvents. The remaining containment areas can accommodate 43 barrels each pure liquid wastes that are compatible with the wastes stored in those areas.
- 5) Run-on cannot enter the container storage building. The floor elevation is at least three feet above ground level, and a full roof covers the building.

FIGURE M-1
BARREL STORAGE BUILDING
Arrangement of Pallets for Storage
of 1000 barrels, four to a pallet,
3 pallets high



Storage of Containers (Cont'd)

- 6) Accumulated liquids in the containment areas will be analyzed for the specific waste types present in the containment area. Liquids will then be manually pumped to the appropriate bulk storage tank for treatment.
- 7) The total number of drums in storage will be determined weekly as specified in inspection schedule M-566, and the total number of liquid barrels in storage will be determined weekly as specified in inspection schedule M-943 for the three sections expected to contain liquids. In the unlikely event the total number of barrels exceeds 500, off-site shipments of waste will immediately be scheduled so that the 864 drums capacity will not be exceeded.

The liquid barrel deficiency levels of inspection Guide M-943 are substantially less than the total allowable for these three sections. If the weekly inspection notes a deficiency, the most recent waste inventory computer report and present computer inventory will be consulted to determine the exact nature and number of liquids in storage, both hazardous and non-hazardous. This computer inventory report is produced weekly. One sample page from this report is included as Exhibit Z. If the number of hazardous waste liquid barrels is found to exceed the deficiency off-site shipments of hazardous waste liquids will be scheduled so that the liquid capacities of each section are not exceeded.

- 8) The aisle space in the container storage building is adequate for the hazardous wastes being stored there. The aisle spaces between storage sections mark the separation between each containment area and are sufficiently wide enough to allow unobstructed movement of personnel with fire or spill control equipment. For additional fire control, the open front of this building will allow quick overhead fire control practices. Any or all sections inside the building can easily be covered with foam or water from P&W fire department vehicles.

Storage of Containers (Cont'd)

As previously mentioned, the total amount of liquids stored will be much less than the total amount of solids in storage. The separate containment areas prevent the mixing of the different liquids which may possibly be spilled. These facts indicate that any spills will probably be small in nature and confined to the separate containment areas where personnel can completely control the spill using the appropriate aisle space.

Figure M1 represents the maximum barrel storage, not the typical condition. Generally there will be less than 500 barrels in storage, allowing even better access and movement within each containment area.

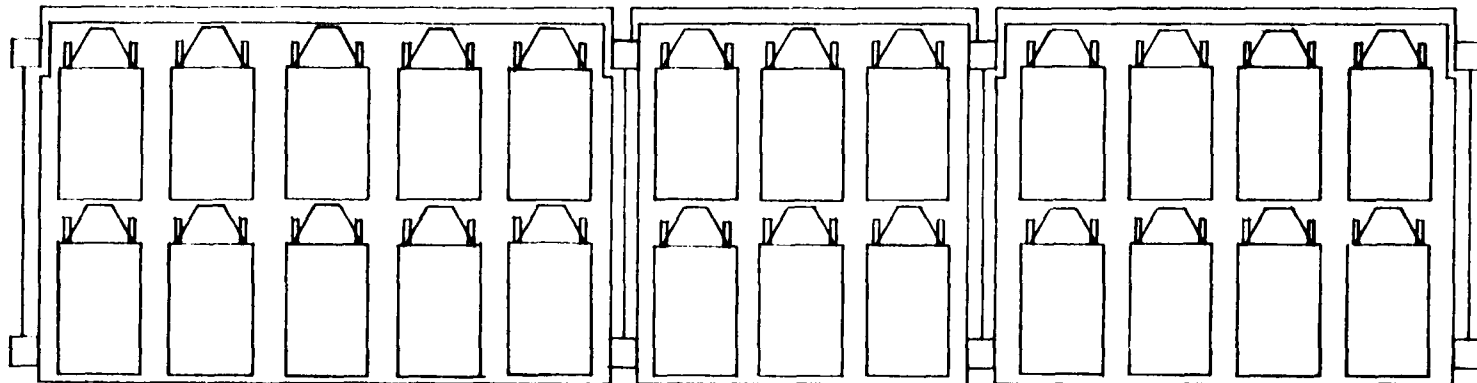
Storage of Containers (Cont'd)

B) Transporter Storage Pad

- 1) The building used for storage of waste transporters is 58' x 16', has a solid concrete floor and a roof. The floor is divided into three compartments each with a sloping floor to the rear of the compartment, and the side of each compartment and the back of the pad are curbed. Acid, alkali and cyanide wastes may be stored in these compartments. No compartment will contain two incompatible wastes as described in the General Contingency Plan. The total number of transporters that can be fitted on the pad is 24. Placement of the transporters on the storage pad is illustrated in Figure M-2.
- 2) The totally enclosed 375 gallon transporters are rectangular, 36" X 42" X 60" and are constructed of 1/4" - 3/8" boiler plate. The transporter conform to DOT Specification through DOT Exemption Notice E-7598. Waste enters the top of the transporter through a 2" valve and leaves through the bottom of the transporter through a 2" Teflon lined diaphragm valve. For the acid transporters, there is a diaphragm at the top of the tank that accounts for any gas expansion and it will burst if the pressure is too great. The transporters are moved by means of a 6000 lb. capacity fork lift. The fork lift prongs engage the transporter through 8" X 5' channel irons that are located under the body of the transporter. The acid, alkali and cyanide transporter are color-coded blue, gray and red respectively to ensure that incompatible wastes are not mixed. The acid transporters are lined with acid resistant materials such as hypalon. The alkali and cyanide transporters are unlined. At

FIGURE M-2

TRANSPORTER STORAGE PAD
Illustration of Maximum Transporter Placement



C-12

Storage of Containers (Cont'd)

the edge of the Barrel Storage Building there are unloading platforms, each specifically allocated for either the acid, alkali or cyanide transporters. When the transporters are in place, the discharge valve is opened and the waste flows to the appropriate storage vessel.

The transporter storage pad is inspected routinely according to Inspection Guide M-572 of this document and the transporters are routinely inspected and maintained according to Inspection Guide M-403.

- 3) Each compartment is sloped so that any liquid falling on the pad will drain to the rear. Transporter tanks are elevated on one foot high legs. They are moved by the use of 6000 lb. capacity fork trucks. The prongs can easily be placed underneath the transporters into 8" wide, 5' long channel irons in order to move the transporters. The sloped areas have a containment capacity of 2850 gallons, (see Section IV, Containment Calculations) and the building holds twenty four (24) transporters with capacities of 375 gallons each. The largest of the compartments will contain 1200 gallons. This is easily more than 10% of the 3750 gallons that 10 transporters can hold in this compartment. The other two compartments which can contain 700 and 950 gallons, hold up to six and eight transporters respectively. Each of the containment values is greater than 10% of the volumes of 2250 and 3000 gallons that six and eight transporters can hold respectively.

Storage of Containers (Cont'd)

- 4) Run-on is prevented from entering the storage building by the curbing around three sides of the building and a berm arrangement at the front of the pad whereby liquid in front of the pad drains in the opposite direction.
- 5) Each containment area has a one cubic foot pit at the rear of the compartment which is used to facilitate manual pumping. Accumulated liquids will be analyzed for the specific wastes present in that area. If contaminated, the liquid will be pumped to an appropriate transporter for eventual discharge to the appropriate bulk storage tank.

C) Barrel/Transporter Storage Pad

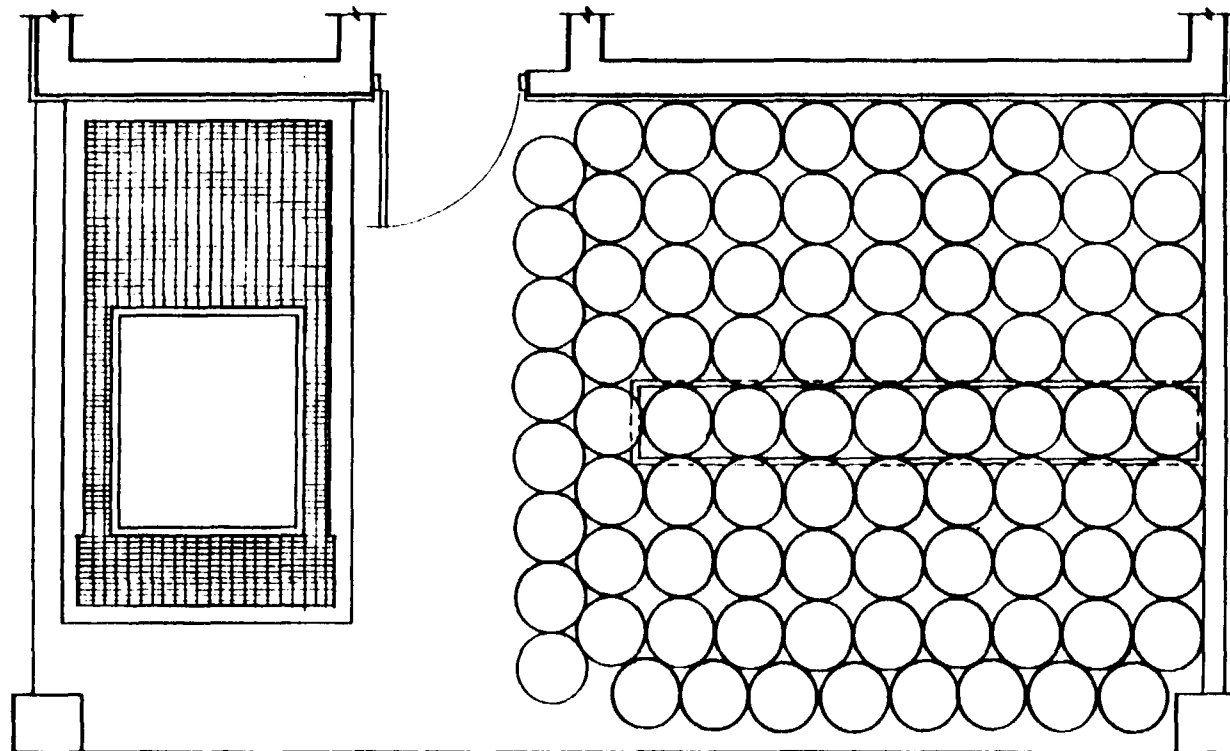
- 1) A small storage pad adjacent to the CWT Main Building is 18 1/2' x 24 1/2' and has a solid concrete floor and a roof.

The floor slopes to a containment pit underneath the floor so that any liquid falling on the pad will drain to the center.

- 2) The containment area can hold 600 gallons of liquid, (see Section IV, Containment Calculations). Any accumulated liquids will be tested for contamination by the material in storage, and then manually pumped to the appropriate treatment tank.
- 3) The storage pad can hold a maximum of 88 barrels stored on pallets or 10 transporters, or a combination of each. Generally, only alkali materials are stored on the pad. Transporters and barrel pallets can be stored safely in any number of ways because of the openness of the area. Placement of the maximum number of barrels and the maximum number of transporters is illustrated in Figures M-3 and M-4.

FIGURE M-3

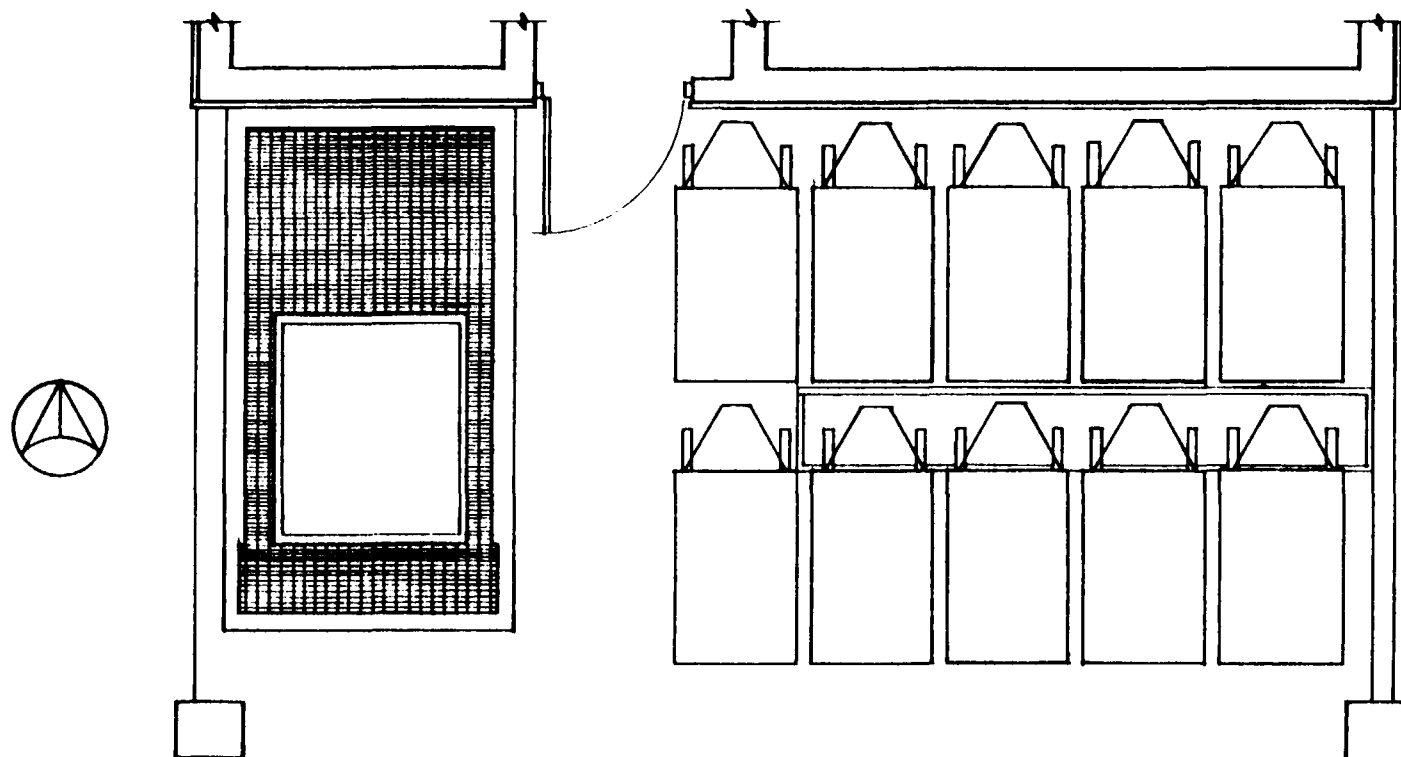
BARREL/TRANSPORTER STORAGE PAD
Illustration of Maximum Barrel Placement



C-13

FIGURE M-4

BARREL/TRANSPORTER STORAGE PAD
Illustration of Maximum Transporter Placement



General Facility Description (Cont'd)

4. Aisle space is not needed because of the openness of this area and the nonflammability of the wastes. This area can be easily reached by all fire control and spill containment equipment.

The drum arrangement in figure M-3 provides the absolute maximum barrel placement for the barrel/transporter storage pad, and not the typical arrangement. In this arrangements, drums will not be stacked, so that all drums could potentially be inspected from the top if necessary.

Storage of Containers (Cont'd)

II Containers with no free liquids

- A) The majority of liquid wastes in storage at the facility are in bulk storage tanks. No more than 350 barrels of liquids will be stored at any one time in the container storage building, (see Section IA), and these liquids will be either paint solvents or waste oils. Solid material stored in the building consists of solid sulfur, aluminum oxide powders, sodium and potassium salts, and laboratory chemicals. The number of barrels of solids will not exceed the total storage capacity of the building (1000) less the number of barrels of liquid waste already in storage (not greater than 350).

III Ignitable, reactive and incompatible waste

- A) Compliance with 264.176 demonstrated on Topographic Map, Section K.
- B) Incompatible wastes are stored in non-adjacent compartments of the storage building.
- C) Training for waste treatment plant operators includes descriptions of waste, descriptions of possible hazards, and descriptions of incompatible waste.
- D) The container storage area is not in an area where there are sources of ignition, open flames, cutting or welding, hot surfaces, frictional heat, sparks, spontaneous ignition, heat producing chemical reactions, or radiant heat. "No Smoking" signs are posted.

- E) Standard operating procedure includes the visual inspection of all barrels of waste before acceptance at the storage facility. Liquids are pumped into bulk storage tanks, except for paint solvents and certain waste oils, which are stored in the building prior to vendor disposal. The contents of the building are inspected daily, and the quantity of drums of liquid is never allowed to exceed 350. Storage information is maintained on the computer record keeping system and updated daily. At any time, the types of waste and the exact number of barrels contained in the storage building can be determined by viewing the inventory on a computer screen, and pages of the inventory can be printed out. An example of the computerized inventory of the Barrel Storage Building is Exhibit Z.
- F) A scaled Figure M-1 showing aisle space for the maximum planned inventory for the barrel storage building is in this section. Included are descriptions of where different wastes are stored in the area, assuring that incompatible wastes will not come into contact with each other. Because of the openness of the areas and nonflammability of the wastes involved, there is no need to provide aisle space in either the Barrel/Transporter Storage Area or the Transporter Storage Area. Figures M-2, M-3 and M-4 show the arrangements of the maximum number of containers in these areas.

IV Containment Calculations:

A) Barrel Storage Building

The Barrel Storage Area has five containment areas each with a 2' x 2' x 2.5' containment pit. Four of the containment areas encompass an area with the dimensions 50' x 28.5' and there is a pitch of 1-1/2" from the edge of the areas to the surface of the containment pit. The fifth containment area is 50' x 18.42' and the pitch is 3" from the edge of the area to the surface of the containment pit.

1. Containment Volume - Four Areas

$$\begin{aligned}\text{Area of Pitch} &= 50 \text{ ft} \times 28.5 \text{ ft} - 4 (2 \text{ ft} \times 2 \text{ ft}) = 1409 \text{ ft}^2. \\ \text{Volume of Pitched Area} &= 1/2 (\text{Area of Pitch}) (1 \frac{1}{2} \text{ in.}) \\ &= 1/2 (1409 \text{ ft}^2) \frac{1.5 \text{ in.}}{12 \text{ in.}}\end{aligned}$$

$$= 88.06 \text{ ft}^3$$

$$\text{Volume of Containment Pits} = 4 (2' \times 2' \times 2.5') = 40.00 \text{ ft}^3$$

$$\text{Total} = 128.06 \text{ ft}^3$$

2. Containment Volume - Fifth Area

$$\begin{aligned}\text{Area of Pitch} &= 50 \text{ ft} \times 18.42 \text{ ft} - (2 \text{ ft} \times 2 \text{ ft}) = 917 \text{ ft}^2. \\ \text{Volume of Pitched Area} &= 1/2 (\text{Area of Pitch}) (3 \text{ in.})\end{aligned}$$

$$= 1/2 (917 \text{ ft}^2) (3 \text{ in.}) \frac{1 \text{ ft.}}{12 \text{ in.}}$$

IV Containment Calculations (Cont'd)

$$\begin{aligned} &= 114.63 \text{ ft}^3 \\ \text{Volume of Containment Pits} &= 2 \text{ ft} \times 2 \text{ ft} \times 2.5 \text{ ft} = 10.00 \text{ ft}^3 \end{aligned}$$

$$\text{Total} = 124.63 \text{ ft}^3$$

3. Total Containment Volume

$$\begin{aligned} \text{Total Containment Volume} &= (\text{Volume of Four Areas}) \\ &+ (\text{Volume of Fifth Area}) \end{aligned}$$

$$= 128.06 \text{ ft}^3 + 124.63 \text{ ft}^3 \left(7.48 \frac{\text{gal}}{\text{ft}^3} \right)$$

$$= 1890 \text{ gal of Total Containment.}$$

B. Transporter Storage Pad

The Transporter Storage Area consists of three separate compartments which contain up to 24 transporters total. The largest compartment can hold 10 transporters. The widths of the three areas are 24.48', 14.17' and 19.53'. The pitch is 10 in. over a 15.67 ft. length.

$$\begin{aligned} \text{Volume} &= 1/2 (24.48\text{ft} + 14.17\text{ft} + 19.53\text{ft}) (15.67\text{ft}) \left(\frac{10 \text{ in.}}{12 \text{ in.}} \right) \left(\frac{1 \text{ ft}}{12 \text{ in.}} \right) \end{aligned}$$

$$= 379.87 \text{ ft}^3 \times 7.48 \frac{\text{gal}}{\text{ft}^3}$$

$$= 2841 \text{ gal.}$$

IV Containment Calculations (Cont'd)

C. Barrel/Transporter Storage Area

The Barrel/Transporter area is adjacent to the East side of the Concentrated Waste Treatment Building. It is used for the storage of barrels of waste kolene salt or alkali transporters. The dimensions on the containment area is 16ft long by 2 feet wide by 2.5 feet deep.

$$\text{Volume} = 16 \text{ ft} \times 2 \text{ ft} \times 2.5 \text{ ft} = 80 \text{ ft}^3$$

$$80 \text{ ft}^3 \times 7.48 \frac{\text{gal}}{\text{ft}^3} = 598 \text{ gal}$$

SECTION N - STORAGE TANKS

I Design Standards

- A) Designs and specifications for tanks and containment are based on Federal, State and local codes and regulations. None of the tanks was specifically designed as a waste storage tank, but each was a no longer utilized spare tank that met the criteria for waste storage. No design specifications were available. The larger acid tank was replaced in August of 1984 with a similar tank and a Hypolon liner. It is estimated that each of the remaining tanks was new between the years of 1964 and 1967. Selection of materials used in designs (piping, tanks, coatings, pumping systems, etc.) are based on manufacturer's standard tables and charts showing compatibility of their products with various hazardous and corrosive materials.

II Design Specifications

- A) Tanks are constructed of various materials depending on storage requirements.
- 1) Tanks used to store corrosive materials are constructed of Fiberglass and/or lined steel.
- a) Fiberglass is classified as good to excellent for corrosion resistance.
- b) Steel tanks are lined with corrosion resistant materials which are classified as good to excellent for corrosion resistance.
- 2) Tanks used to store non-corrosive materials are constructed of steel, welded and reinforced.

Storage Tanks (Cont'd)

B) Piping system construction materials are compatible with the solutions being piped.

1) Piping systems for conveyance of corrosive materials are constructed of PVC (polyvinylchloride) Schedule 80 (heavy duty) pipe.

2) Piping systems for conveyance of non-corrosive materials are constructed of Schedule 80 seamless steel pipe.

C) Containment

1) All storage tanks are set in concrete containment pits. Both the concrete base and walls are 10" thick with #4 rebar. The walls have water stops at the construction points. The base is underlined with 12" of 3/4" traprock. These pits are coated with a high build "Flakeline" 600 epoxy systems manufactured by the Ceilcote Company, Berea, Ohio. The pits are sectioned in order to keep spills of incompatible wastes separate.

III Tank Specifications

A) The waste storage tanks have the following specifications.

<u>MATERIAL STORED</u>	<u>TANK HEIGHT</u>	<u>TANK DIAMETER</u>	<u>TANK CAPACITY</u>	<u>CONTAINMENT VOLUME AVAILABLE</u>	<u>NOMINAL SHELL THICKNESS</u>	<u>ACTUAL SHELL THICKNESS</u>
Acid	7'	10'	4000 g	6500 gal	1/2"	.345"
	7'	7'	2000 g	6500 gal	1/2"	.440"
Solvent	7'	10'	4000 g	7800 gal	1/2"	.280"
Chromium	7'	10'	4000 g	7800 gal	1/2"	.280"
Alkali	7'	10'	4000 g	8300 gal	1/2"	.880"
Cyanide	7'	10'	4000 g	8300 gal	1/2"	.355"
	8'10"	7'8"	2800 g	8300 gal	1/2"	.730"

<u>MATERIAL STORED</u>	<u>TANK HEIGHT</u>	<u>TANK WIDTH</u>	<u>TANK DEPTH</u>	<u>TANK CAPACITY</u>	<u>CONTAINMENT VOLUME AVAILABLE</u>	<u>SHELL THICKNESS</u>	
Wax/Solvent	7'1"	9'5"	7'6"	2500 g	None	1/2"	.360"

<u>MATERIAL STORED</u>	<u>TANK CONSTRUCTION MATERIAL</u>	<u>PIPING MATERIAL</u>	<u>LINER</u>	<u>DATE LAST LINED</u>
Acid	Steel	PVC	Dupont Hypolon	New - 8/18/84
	Fiberglass	PVC	Triple Flux 64	10/25/82
Solvent	Steel	Steel	None	-
Chromium	Steel	PVC	64 (Carbon-Fiberglass)	12/02/82
Alkali	Fiberglass Coated Plywood	Steel	None	-
Cyanide	Steel	Steel	None	-
	Fiberglass	Steel	None	-
Wax/Solvent	Steel	Steel	None	-

Storage Tanks (cont'd)

IV Piping Diagram

- A) A diagram of system piping is included as Exhibit V.

V Description of Feed System

- A) Storage tanks are fed by gravity flow from transport tanks and by pumping from tankers.
- 1) Tankers are parked on concrete pads with built in containment in case of spills during unloading operations. Tanker pad containment is built to hold the entire contents of a tanker (5000 gal) plus the precipitation from a 25 year 24 hour rainfall.
 - 2) Transporters are unloaded on specially constructed ramps located inside the barrel storage building (Section C), which has containment for spills as previously described.
 - 3) No liquid level indicators are currently associated with the storage tanks. However capacitance level indicators with level alarms are planned for the future. Until these indicators are installed, the same procedure followed under interim status will be applied. This entails maintaining sufficient tank freeboard by direct inspections.

SECTION - 0 - LIQUID INJECTION INCINERATOR

I Introduction

During early 1979 P&W Management approved an appropriation request to construct a liquid injection industrial waste incinerator. On September 19, 1979 an application to construct and operate this incinerator was submitted to the Connecticut DEP Air Compliance Unit. The Permit to construct the incinerator was granted on August 4, 1980 with construction commencing immediately. The construction was essentially complete in April 1981. Since that time there have been numerous start-up problems including high fan noise levels and high particulate emissions. The incinerator has never been operational to this date.

There will be four (4) different wastes burned in the incinerator, blend oil, zyglo solution, cyanides and wax/solvents. Each of the wastes is injected into the incinerator from a separate nozzle except the zyglo solution and the cyanide. Because these are basically aqueous solutions with similar atomizing characteristics they are injected using the same nozzle.

The blend oil which is injected in nozzle #1 is not a hazardous waste and would be used for its BTU value. The oil is a blend of oil, from the treatment of soluble oils and waste lubricating oils to give a flash point of 200-250°F. Gas chromatographic analysis of this oil has shown no detectable levels of aromatic or straight chain chlorinated hydrocarbons. No ignitable wastes (flash point less than 140°F) are present in this blend.

Nozzle #2 injects either cyanide or zyglo solutions. The zyglo solutions are also non-hazardous and will be burned only as a method of disposal. The cyanides are from spent plating and cleaning solutions. The main hazardous constituents in this waste and their respective EPA hazardous waste numbers are sodium cyanide, P106; potassium cyanide, P098; with minor amounts of copper cyanide, P029 and nickel cyanide P074. There are also traces of cadmium, silver, iron and zinc. In addition the cyanide wastes are also listed having EPA hazardous waste numbers of F007, F008, and F009.

Wax/solvent mixtures, oil/solvent mixtures and just solvent mixtures will be incinerated from nozzle #3. The wax is a non-hazardous straight chain paraffinic hydrocarbon wax used as a masking wax during plating. The oils contained in the mixtures are non-hazardous lubricating oils used in various machining processes. The solvents which will be burned are described in more detail in Section B, III E, F, and G.

II Engineering Description of Incinerator

The incinerator located at the P&W concentrated Waste Treatment Plant is a Burn-Zol Model 272 liquid waste incinerator. Physically the incinerator is 6'6" O.D. x 21' 3" high with 3" of forced air cooling between the outer stainless steel shell and the steel inner shell. There is then a minimum of 6" of high temperature acid resistant refractory lining. The primary and secondary combustion chambers and the tertiary holding chamber are 5' in diameter or 19.5 square feet in area.

The primary chamber has two (2) dual fuel Maxon 3" multifire II burners rated at 1.5 MM BTU/hour each. These burners use either natural gas or No. 2 fuel oil and are presently set up for natural gas. There are also (3) three nozzles in this chamber for injection of wastes. Each nozzle is air cooled and is accessible from the outside for interchanging nozzles for proper atomization of waste charges.

The secondary chamber has one (1) dual fuel Maxon 4" multifire II burner rated at 2.5 MM BTU/hour. All burners have Protectofier flame safeties on the pilots and 20:1 throttleable and proportional control. Refer to Exhibit W, pages 1-5, for Burn-Zol Specifications of the incinerator and sketch of equipment layout.

The temperature in each burner zone is controlled by a Partlow proportional controller from a thermocouple located in the zone. In the primary zone there is also a second thermocouple that goes to a Partlow High temperature limit control. At the exit of the incinerator is a fourth thermocouple that goes to a Partlow 24 hour circular chart recorder for continuous record of incinerator exit temperature.

Combustion products from the incinerator are ducted to an Eclipse Model 3 HRW waste heat boiler which generates hot water. In the inlet duct to the boiler is a thermocouple connected to another Partlow proportioning temperature controller. This controller through a cooling blower and damper, tempers inlet air to the boiler at 1600⁰F to protect the boiler from overheating. A pitot tube with indicator is in the duct before this blower to indicate combustion gas velocity. Generated hot water is presently being cooled in a B & G tube and shell heat exchanger with the cooling water being dumped to a NPDES permitted cooling water discharge. Eventually this will be used for building heating.

From the boiler combustion products are then ducted to a Hydronics Model VS 72 venturi scrubber and a Hydronics Model PTS 72 packed tower counterflow scrubber operating with caustic wash. Both scrubbers are fabricated of stainless steel and the tower contains polypropylene Tellerette packing. To protect the packing there is a thermocouple and temperature switch in the inlet duct that will shut down the incinerator before the packing has any thermal damage. There is also a liquid manometer across the venturi to indicate pressure drop. The pressure drop is used as an indication of air velocity and venturi scrubber

efficiency. The venturi scrubber is designed for particulate removal while the packed tower has high gas/liquid area for removing fine particulate and neutralizing acids in the waste gas stream. At the exit of the scrubbers is a demister system to remove liquid entrainment in the air stream. The caustic wash is contained in a 400 gallon tank and circulated through the scrubbers at 65 gpm. The pH is controlled at 7.0-8.5 by addition of liquid sodium hydroxide. The pH controller is a Serfilco Model 440.

The air from the demisters is ducted through a damper system to one of two air prime movers. These are New York Blower Series 45 G1 Fans, size 264 with 60 HP motors rated at 4000 cfm at 37" water. One blower is the prime mover with the second used as a back-up. Any failure of the prime mover and the system will automatically switch to the back up. This is controlled by a pressure switch in the inlet duct to the blowers. On the back-up blower the system is strictly in cool down. No burner operation or waste feed will take place while the back up blower is running.

The exhaust from the blower is directed out of the building. In this exhaust stack is a sampling port that is also valved to the inlet duct of the scrubbers. Either location can be monitored by a Charlton Technology Inc. Incinerator Monitoring System that monitors CO and O₂. Company brochure is included as Exhibit Y.

The incinerator system is monitored and controlled by an Industrial Solid State Control, Inc. Model IPC 90 microprocessor. This microprocessor controls the start up procedure to insure that all items are functioning properly before the next step in the operating procedure can be initiated. The microprocessor also controls the ability of the operator to energize the waste feed pumps. This is done by having a relay control all power into the pump control panel and this relay is energized from the microprocessor only when all the safety and control

interlocks are satisfied. These interlocks are:

1. Incinerator is at set point temperature.
2. Boiler water at the proper level.
3. Temperature into scrubbers is below 150° F.
4. Scrubber pH in proper range.
5. Main system blower is functioning properly.
6. CO and O₂ in exhaust gases are within set limits.
7. Waste flow rates not exceeding 0.8 gpm.
8. Control air pressure within proper range.

Once the pump control panel is energized any one of four (4) waste feed pumps can be energized. These are blend oil that feeds into waste nozzle #1; either cyanide or zyglo that feeds into waste nozzle #2; or wax/solvents that feeds into waste nozzle #3. The line to each of the nozzles has a solenoid valve that is energized open when the pump for that line is energized. Each line also has a Foxboro differential pressure flow transmitter Model E13DM-1KAM2-1FOU with a stainless steel orifice.

This signal is sent to a Foxboro Model 65PV-JG indicator and Model 63R flow switch. Each of the flow indicating systems is calibrated at 1 gpm full scale. Feed rates will be monitored and recorded by the operator. In the piping just before the nozzle is also a sampling valve to collect waste samples for analysis. The nozzles in each line are from Sonicore Atomizer Division of Sonic Development Corporation and were picked for atomization to give most efficient burn.

III Suggested Operating Conditions

The suggested operating conditions for burning the hazardous wastes are:

1. Combustion zone temperature of 1832 to 2000°F.
2. Waste flow rates as proposed in the Trial Burn Plan, Section V
3. Scrubber water flow rates and removal rates as proposed in the Trial Burn Plan, Section V.
4. Temperature of scrubber inlet and outlet streams as proposed in the Trial Burn Plan, Section V.
5. CO amounts in the exhaust stack of 0 to a maximum of 50 ppm.
6. Maintaining the pH of the scrubber water between 7.0 and 8.5
7. Maintain a 26 to 30" water pressure drop across the venturi scrubber and 0.25 to 0.5" water negative pressure at the inlet to the waste heat boiler. These conditions will indicate proper combustion gas velocity and will control fugitive emissions by assuring the system is under negative pressure.
8. With the caustic scrubber the removal of hydrochloric acid is expected to be 99.9%.

IV General Operations Manual

The following is a general operations manual for the hazardous waste incinerator presented in outline form. This material complement the Incinerator Monitoring Systems Operations Manual presented in Exhibit Y.

BURN-ZOL INCINERATOR OPERATION

1. Preparation for starting.
 - A. Check gas valves are open.
 - B. Open caustic valve on scrubber water pH control system.
 - C. Check all equipment for freedom from obstructions.
 - D. Check that "manual-off-automatic" switch inside panel is on automatic setting and delay relay is set at 3-4 hours.
2. Starting
 - A. Turn "cool down-on line" switch to the on line setting. The normal sequence of operation is:
 1. No. 1 main exhaust fan runs for 20 sec. to prove operation.
 2. Everything off for 20 sec.
 3. No. 2 main fan, scrubber system, combustion air fan and cooling fans turn on for 90 sec. incinerator purge.
 4. Pilots to the three burners turn on and are confirmed by the flame safety detector.
 5. Main burner valves cycle open.
 - B. Bring temperature to operating temperature at the rate of 300⁰F per hour.
 - C. When the desired operating temperature is reached the blue "Waste fuel safety" light will become lit.
 - D. When this blue light is lit, the waste flow panel is energized and the pump for the desired waste stream can then be energized.
 - E. Adjust the desired flow on the flow meter panel by adjusting the flow bypass valve.

(continued)

3. Shut Down

A. Turn "cool down-on line" switch to the "cool down" setting.

1. This will shutdown everything except the main fan, scrubber pumps, combustion and auxilliary cool down fans, and boiler feed pump.
2. These fans will run for the time set on the time delay relay as set in Section 1-d.

This shutdown procedure applies for all shutdown conditions (including emergency) except for the main exhaust fan failure. If the main exhaust fan fails:

A. Open cabinet and switch the "manual-off-automatic" switch to the manual setting and energize the switches marked No. 1 fan, No. 1 scrubber, boiler feed, and burner blower.

4. Automatic Shutdown

A. On a predetermined drop in temperature;

1. Blue "waste fuel safety" light will go off and waste fuel panel is de-energized.
2. When temperature returns to set point the "waste fuel safety" will energize, but as a safety measure the waste fuel pumps must be manually restarted.

(continued)

B. On failure of scrubbers, gas pressure, compressed air, combustion air, burner, boiler or system blower failure:

1. The system will operate in "cool down" mode with the alarm horn sounding and the indicator light lit to show the failure mode.
2. The alarm silencer button will silence the horn, but the indicator light will still indicate the failure made.
3. If the failure is corrected - push the "reset" switch and the system returns to the operations in the starting procedure.

5. Restarting - warm

The system is microprocessor controlled. If the system is in the cool down mode and the system is to be restarted:

- A. Turn the switch to "on line" and it will cycle through the regular starting procedure.

6. Operation

- A. The program in the microprocessor controls the operation of the incinerator system. If the incinerator is turned on and it does not complete the operation cycle as outlined, check for malfunction in the microprocessor input /output boards. Each point on the board has a 0.1 amp protective fuse that should be checked.

(continued)

- B. If the program gets to the burner pilot lighting step, and they do not light, the protective fuse will kick off on overload. Push the reset on the protective fuse and let it recycle. If it still does not start, check the sensor lense for dirt.

- C. Consult manufacturer's literature for specific maintenance procedures on other malfunctions.

V Trial Burn Plan

A trial burn plan has been prepared by Recon Systems Incorporated and is presented in Appendix III. The remaining material in this section complement their plan.

At this time, no dates have been set for the trial burn due to the excessive particulate problem presently under review. Upon successful resolve of this problem, dates for the trial burns will be scheduled. A pretest conference will be held with the DEP at least two weeks prior to the trial burns.

A. Waste Analysis

There will be minor changes in waste compositions since they are a bulk composition of many waste streams. At the time of actual burn tests approximately 2000 cc of sample will be taken from just before the injection nozzle every 15 minutes and combined for a representative sample. This must be done to compare with exhaust stack results and show a 99.99% DRE.

1. Cyanide Waste Feed

A typical sample of concentrated cyanide waste yielded the following chemical analysis:

pH	- 11.3	Fe	- 400 mg/l
Solids	- 190,000 mg/l	Ni	- 5840 mg/l
Al	- 42 mg/l	Ag	- 130 mg/l
Cd	- 144 mg/l	Zn	- 11 mg/l
Cr ⁺⁶	- 0 mg/l	Na	- 57,500 mg/l
Total Cr	- 18 mg/l	K	- 42,500 mg/l
Co	- 20 mg/l	CN	- 26,400 mg/l
Cu	- 300 mg/l	Another sample had a cyanide (CN) content of 59,900 ppm.	

PAGE
16 - Appendix
CN - POC

This is an aqueous solution with no heating value and flow characteristics of water. These are inorganic plating solution wastes therefore there are no POHC's in the waste. EPA Hazardous Waste Numbers are F007, F008, and F009. The following hazardous constituents may be included in the waste solution:

P029 Copper Cyanide	P106 Sodium cyanide
P030 Cyanides	P074 Nickel cyanide
P098 Potassium cyanide	

An analysis was performed for a subsequent sample of cyanide waste in order to account for the organics that might be contained in the cyanide waste stream. From the sample, taken from a waste cyanide bulk storage tank, analytical results were as follows:

CN -	21,300 mg/l
Purgable Organics -	less than .1 ppm for each parameter analyzed
Oil and Grease -	48 mg/l
TOC -	3.88%
TOX -	less than .01 ppm

The analytical results are attached to Exhibit X.

2. Wax/Oil/Solvents waste feed

A typical sample of this waste yielded the following chemical analysis.

Wax - straight chain paraffinic hydrocarbon wax	75%
Solvent - supernatant	25%
Refer to Exhibit X (2 pages) for analysis of the supernatant.	

An additional sample was taken from the heated and mixed waste wax/solvent tank. In order to account for the organic constituents in this waste stream, an analysis was performed as follows:

Solid Portion (80% of sample), identified as paraffin wax.

TOC - 64.8%

Liquid Portion (20% of sample)

Water Content - 85%

Tetrachloroethylene 15% (No other significant organics detected).

TOC - 2.21%

The analytical results are attached to Exhibit X.

The average heating value of this waste is 7500 BTU/lb.

To pump this wax into the incinerator it is heated to 140°F at which temperature it has a viscosity of approximately 35 SSU.

The wax/oil/solvent mixture is variable containing the constituents as described in Section B III E and F. The following constituents and their respective EPA hazardous waste numbers are most likely to be designated as POHC's:

1. 1,1,2,2-Tetrachloroethylene, U210
2. 1,1,1-Trichloroethane U226
3. Carbon Tetrachloride U211
4. Trichloroethylene U228
5. Methylene Chloride U080

Only constituents 1 and 2 above are likely to be present in substantial quantities during incineration of these waste mixtures.

3. Waste Solvent Mixture

A third stream similar to that in Section 0 V A(2) except without the wax will be burned. The solvents could include any or all of the constituents as described in Section B III F. Rates of generation are unpredictable but the following constituents and their respective EPA hazardous waste numbers are most likely to be designated as POHC's:

1. 1,1,2,2-Tetrachloroethylene, U210
2. 1,1,1-Trichloroethane U226
3. Carbon Tetrachloride U211
4. Trichloroethylene U228
5. Methylene Chloride U080

Only constituents 1 and 2 above are likely to be present in substantial quantities during incineration of these waste mixtures.

B. Emission Control Equipment Operating Conditions

Fugitive emissions will be controlled by maintaining the system under negative pressure. This is monitored with a water manometer between the incinerator and waste heat boiler. This also indicates whether the boiler tubes are free and clean.

C) Emergency Procedures

During the trial burn and normal operations, the system microprocessor continuously scans all alarm points and automatically shuts the incinerator down on the following schedule.

1. If the negative pressure at the inlet to the main induction blower is not high enough the waste feed pumps, solenoid valve in feed lines and the burners will shut down and the system will automatically switch to the back-up blower for system cool down. There is no system bypass.
2. If any of the following happen the burners and pump will shut down, solenoid valves will close, and the alarm horn will sound:
 - a) Secondary combustion chamber temperature drops below 1832°F.
 - b) Flow rate exceeds 0.8 gpm.
 - c) Scrubber water pH drops below 7.0.
 - d) CO in the stack exhaust gas exceeds 50 ppm.
 - e) Lose control air pressure.

Any malfunction, besides sounding the alarm horn, will indicate the source with lights on the panel. To resume normal operation there is a manual reset button that must be pushed. The system will not reset unless the cause of the malfunction alarm has been rectified.



Contents

Page 1	Highlights
2	Company Description
3	Sales by Organizational Unit
5	Report from the Chairman
7	Review of 1983
13	Financial Review
16	Five-Year Summary
18	Management's Discussion and Analysis of Results of Operations and Financial Position
21	Comparative Stock Data
22	Management's Responsibility for Financial Statements
22	Report of Independent Accountants
23	Consolidated Financial Statements
28	Notes to Financial Statements
39	Consolidated Summary of Business Segment Financial Data
42	Selected Quarterly Financial Data
43	Board of Directors and Committees
44	Management

Cover

The cover map symbolizes United Technologies' commitment to global growth. Already over 36% of the corporation's revenues come from overseas markets, and United Technologies expects these to expand further during the remainder of the 1980s.

Highlights

Our Performance in Brief

	1983	1982
Sales	\$14.67 billion	\$13.58 billion
Income before extraordinary item and cumulative effect of change in accounting principle	\$ 509 million	\$ 427 million
Net income	\$ 509 million	\$ 534 million
Earnings per share:		
Income before extraordinary item and cumulative effect of change in accounting principle:		
Primary	\$ 7.94	\$ 6.73
Fully diluted	\$ 7.48	\$ 6.41
Net income:		
Primary	\$ 7.94	\$ 8.74
Fully diluted	\$ 7.48	\$ 8.01
Dividends per common share	\$ 2.55	\$ 2.40
Year-end business backlog	\$12.10 billion	\$11.70 billion
Research and development	\$ 971 million	\$ 834 million
Capital expenditures	\$ 675 million	\$ 528 million

Significant Balance Sheet Items

	December 31,	
In millions	1983	1982
Assets		
Current assets	\$5,019	\$4,604
Fixed assets — net	2,688	2,386
Other	1,013	1,003
Liabilities		
Current liabilities	\$3,373	\$3,050
Long-term debt	869	927
Other	694	534
Shareowners' equity	\$3,784	\$3,482

United Technologies is a broad-based designer and manufacturer of high-technology products with global headquarters in Hartford, Connecticut. The corporation employs close to 194,000 people, operates about 300 plants, and maintains sales and service offices in about 50 countries around the world. United Technologies is among the 50 largest industrial companies in the world, the seventh largest manufacturer in the United States, and the third largest defense contractor in the United States. Sales are balanced among four attractive industries: aerospace, building systems, electronics, and automotive. The corporation's best-known products are Pratt & Whitney aircraft engines, Sikorsky helicopters, Norden defense systems, Carrier air conditioning systems, Otis elevators, Hamilton Standard controls, Essex wire and cable, Inmont specialty chemicals, and Mostek semiconductor products and systems.

Originals in color.

Sales by Organizational Unit

■ Power	35%
\$5.1 billion	
Pratt & Whitney	
Elliott	
Fuel Cell Operations	
International Support	
Systems	
■ Building Systems	33%
\$4.9 billion	
Carrier Air	
Conditioning	
Otis Elevator	
Essex	
Building Systems	
Company	
■ Defense	13%
\$1.9 billion	
Sikorsky	
Norden Systems	
■ Industrial	12%
\$1.8 billion	
Inmont	
Automotive	
■ Controls/Mostek	8%
\$1.2 billion	
Hamilton Standard	
Mostek	
Eliminations	(1%)
(\$0.2) billion	
Total	100%



Dear Shareowner

United Technologies posted strong results in 1983. Net income from operations advanced 19% on a sales gain of 8% over 1982. This excellent performance, in the face of lower aircraft engine shipments and unfavorable foreign exchange rates, attests to the stability and balance we have achieved through diversification over the past decade.

Recovery in the automotive, semiconductor, and air conditioning markets paced our progress in 1983. In addition, we benefited from a healthy military business. 1983 was indeed a year of achievement. We set new goals, won important contracts, launched new products, and named a new president, Robert J. Carlson, as well as a new senior executive vice president, Hubert Faure. The corporation's operations were realigned according to the global markets they serve — Power, Defense, Industrial, Controls, and Mostek reporting to Mr. Carlson, and Building Systems reporting to Mr. Faure.

United Technologies' outlook for the coming year is good. Reduced military business will make earnings improvement difficult at Pratt & Whitney. Most of our North American commercial and industrial businesses, however, should benefit from the continued domestic economic recovery that is anticipated in 1984. Sales to the United States and foreign governments of helicopters, electronic systems, and other military equipment also look promising.

Management Objectives

Management's goal has been to make United Technologies a balanced, multi-industry company, aggressive in pursuing and creating opportunities. We are focusing on a few large and growing global markets, and on being a leader in those markets. Today, United Technologies is a leading participant in four attractive industries: aerospace, building systems, electronics, and automotive.

Our products are designed to have a clear competitive advantage and the lowest manufacturing cost. To support this aim, we plan to increase our capital expenditures from the \$674.8 million spent in 1983. Most of these outlays will be for new equipment and manufacturing processes to

improve productivity, not to increase capacity. By improving productivity, cutting costs, and achieving selected vertical integration, we should improve our cost base. We are expanding selectively into new businesses that build on our capabilities in high technology, increasing our application of microelectronics technology to product development, and expanding our presence around the globe.

Military and Commercial Prospects

We are the third largest defense contractor in the United States. Pratt & Whitney, Sikorsky, Norden Systems, and Hamilton Standard all hold leading positions in their military businesses.

In the commercial arena, 1983 saw improvement in the automotive, semiconductor, and air conditioning markets. This momentum — as well as improvement in wire and cable — is expected to continue in 1984. Recovery in the commercial aerospace industry, anticipated to begin moderately in 1985, should benefit Pratt & Whitney and Hamilton Standard. And prospects for continued growth appear good for Otis and Carrier and for our Building Systems Company's unique package of equipment, electronic systems, and telecommunications services for new or modernized commercial buildings.

Research and Development Paying Off

We are maintaining our historic commitment to research and development in order to develop technologically superior products at low manufacturing costs. We expect to invest \$1 billion or more of company funds in R&D annually through the remainder of the decade.

An important example of research-fueled growth is Pratt & Whitney. Already the commercial market leader, it is the only manufacturer in the large jet engine industry involved in the development of three totally new third-generation jet engines covering the entire commercial market. And we believe our new family of small turboprop engines has the potential of boosting Pratt & Whitney Canada's leading share of the commuter and executive turboprop aircraft market even higher.

Another example of research paying off is Otis. As the world's leading elevator builder, Otis is maintaining its market share as a result of its microprocessor-controlled Elevonic 401 for high-rise buildings and new competitive entries in the geared and hydraulic elevator segments.

Applying electronics technology to our current markets and to the opening up of new markets is a key element of our growth strategy. Microelectronics technology yields increased capability and productivity. That is why we are determined to continue to apply a digital approach right across our product line — from the electronic controls for Carrier air conditioners and Pratt & Whitney jet engines, to microprocessors that improve the efficiency of drawing

Harry J. Gray, chairman and chief executive officer (right), and Robert J. Carlson, president.

copper wire at Essex, or control the mixing of colors for automotive paints at Inmont.

At our Building Systems Company, electronics is giving rise to "intelligent" buildings through the integration of hardware, sensors, and software to make buildings function more efficiently.

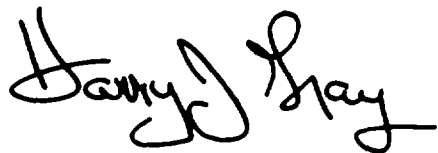
Global Growth

We are establishing United Technologies as a global enterprise and continuing to enlarge our role in world business. We have improved our geographic balance and participation in the world's most rapidly growing economies. Now we must not only adapt our product and selling strategies to markets and customers that are becoming worldwide, but also purchase our materials and manufacture our products around the globe to achieve low cost and efficient operation.

During the rest of the 1980s, our international operations are anticipated to grow at a faster pace than those in the United States as a result of internal expansion, new joint ventures, and selective acquisitions. In 1983, we formed a European Advisory Council, composed of outstanding European business executives, to help shape policies and practices for the development of business opportunities in Europe. We plan to expand this activity to include other economically important areas such as the Far East and Latin America.

Ready for 1984 and Beyond

Our challenge for the remainder of the decade is to take full advantage of the potential of our businesses. Because we are in the right markets with the right products, United Technologies is positioned to move forward around the world in 1984 and beyond.



Harry J. Gray
Chairman and Chief Executive Officer



Robert J. Carlson
President

January 30, 1984

'83

United Technologies' 1983 net income from operations rose 19% to a record high of \$509.2 million. Sales reached \$14.7 billion, also the highest in the corporation's history. Net income for 1982 was \$426.9 million, excluding two extraordinary, non-recurring items of about \$106.8 million. The turnaround of the United States economy, a growing defense business, and market share improvements in 1983 more than offset a decline in jet engine shipments and unfavorable foreign exchange rates.

Sales generated from commercial and industrial businesses totaled \$9.9 billion, up 9% over 1982. Government-related revenues advanced 7% to \$4.8 billion, representing 33% of total volume. The year-end backlog stood at \$12.1 billion.

Gross profit margins for the total year in 1983 averaged about the same as 1982, although improving steadily throughout the year. United Technologies' investment in research and development in 1983 rose at a faster rate than sales, reaching \$970.8 million. However, a decline in selling and administrative costs as a percentage of sales, lower interest expenses, higher other income, and a slightly lower effective income tax rate all contributed to a higher net income from operations.

Primary earnings per share for 1983 were \$7.94, based on the 55,717,000 average number of common shares outstanding for 1983. For 1982, primary earnings per share were \$6.73, excluding \$2.01 from the two extraordinary gains, based on the 53,105,000 average number of common shares then outstanding.

Fully diluted earnings per share were \$7.48, based on the 68,101,000 average number of fully diluted shares during 1983. For 1982, fully diluted earnings per share were \$6.41, excluding \$1.60 from the two non-recurring items.

The corporation in 1983 redeemed its \$3.875 convertible preferred and has announced it will redeem the \$8.00 convertible preferred on April 2, 1984. Also in 1983, the board of directors increased the quarterly dividend on the common stock from 60 to 65 cents a share.

The depressed condition of the commercial airline, general aviation, and turbomachinery markets continued to affect Power's results in 1983. Overall, sales declined slightly to \$5.1 billion. Profits dropped in 1983 as a result of lower unit volume, higher research and development spending, and a shift in sales volume from mature engines to those under continuing development.

Government Products Division

Military engine and spare parts revenues dipped 3% to \$2.5 billion in 1983. Increased parts sales failed to fully offset a decline in engine shipments. Pratt & Whitney's development work accelerated on new military programs.

New Military Engines Progress

Development of two new engines derived from the F100 — the PW1128 and PW1120 — continued in 1983. The higher-thrust PW1128 won further government funding and has been performing well in its test flights on the F-15 fighter. Development of the PW1120 for new foreign aircraft continued on schedule. Pratt & Whitney has proposed to re-engine the F-4 fighter with the PW1120, which substantially upgrades its flight performance. Pratt & Whitney's proposal is under study by the U.S. Air Force.

Pratt & Whitney's proposed PW5000 engine won one of two \$203 million contracts awarded as the next phase of the 50-month Joint Advanced Fighter Engine competition. Pratt & Whitney will produce a demonstrator engine by 1988 for the Air Force to consider for its new Advanced Tactical Fighter proposed for service in the 1990s.

The company's PW3005, a joint effort between the Government Products Division and Pratt & Whitney Canada,

was selected for funding in another competitive development program. It is being designed to power a new military tilt-rotor aircraft (JVX) as well as to re-engine existing fuel-inefficient military aircraft.

Late in 1983, Pratt & Whitney signed an agreement with McDonnell Douglas for the PW2037 commercial engine to power the four-engine C-17 military transport.

Commercial Engine Leadership

Pratt & Whitney's share of commercial engine orders for widebody aircraft increased in 1983. The advanced Dash 7R4 version of the JT9D increased its position against competition and was specified in major orders from Singapore Airlines, Japan Air Lines, and Qantas of Australia. The JT8D remained No. 1 on standard-body aircraft, with important selections by British Airways, American Airlines, and Texas Air. Two key wins for the PW2037 were at Northwest and Singapore Airlines. Overall, Pratt & Whitney won 77% of the commercial engines ordered in 1983.

Pratt & Whitney is the only manufacturer in the industry with three new engine programs covering the entire thrust range for commercial airline transports. The PW2037, embodying new standards of fuel efficiency, received FAA certification in December. Production shipments are scheduled to begin in 1984. The PW4000 is our next-generation engine for widebody aircraft. Pratt & Whitney has completed the design and set stiff manufacturing cost targets for the PW4000. Several of its component tests already have been run successfully. The engine is scheduled to be available in 1986.

In October, 1983, Pratt & Whitney received United States Justice Department clearance to take a leading participation in International Aero Engines AG, a five-nation consortium venture. The venture will develop and produce the V2500 as a powerplant for proposed new 150-passenger aircraft, as well as advanced versions of existing standard-body planes. The V2500 is scheduled to be ready for the world's airlines in 1988.

Commercial Engine Sales Up

Sales of commercial engines and spare parts were up 7% in 1983 at \$1.7 billion. Long-term cost reduction programs contributed to improved gross margins on both JT8D and JT9D engines. Operating results still declined, however, as a result of a shifting product mix, as well as higher R&D and marketing expenses.

Shipments of JT8Ds declined in 1983 from 350 to 224. Despite termination of Boeing's JT8D-powered 727, good demand for the JT8D continued on Boeing's 737-200 and McDonnell Douglas' MD-80. McDonnell Douglas also launched the MD-83, powered by an advanced version of the JT8D engine. Volume was up on the JT9D from 130 to 158 because of market share gains and introduction of the new Airbus Industries A310 and Boeing 767.

Pratt & Whitney Canada

Because of the sharp decline in the general aviation industry for the second year, Pratt & Whitney Canada's sales were down substantially in 1983 to \$409 million. Engine shipments dropped, and research and development expenditures increased for future engines.

Some improvement in sales for the Canadian company could begin in 1984. Customers will begin taking delivery of such aircraft as the Beech 1900 and King Air 300, Cessna's Caravan I, and trainers for the U.S. Navy, all of which are powered either by the PT6 turboprop or JT15D turbofan. Four models of the PT6 engine and two models of the JT15D received FAA certification in 1983.

The new PW100 turboprop will power the deHavilland Dash 8, Embraer Brazilia, and Aerospatiale/Aeritalia ATR-42, new 30-50 passenger commuter aircraft. The PW100 enters production in 1984. In addition, Pratt Canada's engines were selected to power two new, pusher-type business aircraft. In pusher aircraft, the propeller is mounted behind the engine.

Difficult Year for Other Power Operations

Elliott experienced a sharp decline in its sales and earnings in 1983, reflecting depressed demand in the turbomachinery industry. However, good progress was made in product development and cost reductions.

Fuel Cell Operations' profitability was maintained in 1983. Shipments of small units to American utility companies began under a Department of Energy contract, and work continued on major fuel cell projects in Tokyo and New York.

International Support Systems continued its programs in Mexico and Saudi Arabia, and bid on a number of new projects.

Building Systems

Building Systems sales rose 11% in 1983 to \$4.9 billion, representing 33% of United Technologies' total. (These figures include Essex, which is now in Building Systems as a result of the corporate realignment in 1983.) Profit declined from 1982 because of the impact of unfavorable foreign exchange rates on Otis and Carrier, as well as start-up losses for Building Systems Company.

Recovery Begins at Carrier

Carrier's sales advanced about 13% to approximately \$2 billion in 1983 because of the turnaround in the United States residential air conditioning market. Operating profit increased even more rapidly, thanks to cost reduction programs.

In the United States, residential demand increased steadily along with housing construction throughout the year, while high-rise building remained in the doldrums. A number of new products were launched, including the first commercial entries with microprocessor-based controls. Carrier maintained its leading position in both residential and commercial unitary systems. In 1984, residential air conditioning shipments are expected to continue growing, and some improvement is projected in low-rise commercial construction as well.

Outside the United States, demand for air conditioners was poor. However, Carrier booked contracts for record numbers of big-building air conditioning systems in the Far East, among them, for Raffles Center in Singapore. Carrier's strategic push overseas during the year also included two important Carrier-controlled joint ventures: Delchi-Carrier in Italy and Springer-Carrier in Brazil. With these steps, Carrier became the largest manufacturer of room air conditioners in Italy and in all of South America, and moved up to No. 2 in the world market for room air conditioners. It is already No. 1 in all other categories of air conditioning.

Otis Maintains Its Number 1 Position

Otis' sales and earnings were strong in local currencies as a result of market share gains in new equipment and increased service maintenance contracts. Foreign exchange rates, however, caused unfavorable translation of results to the dollar. Reported sales were about flat at \$1.9 billion, and profits dipped.

In the United States, sales of gearless elevators were down due to the reduced construction of high-rise buildings. The introduction of new products, however, enabled Otis to raise its share of the domestic geared and hydraulic elevator sales to 25% and 19%, respectively. Profit margins in the United States improved because of the lower-cost design of the new entries and higher service volume.

In the Pacific area, Otis won five of the six major contracts in high-rise buildings awarded during the year in Hong Kong, Singapore, and the People's Republic of China. New ventures formed in Taiwan, Thailand, and the People's Republic of China bolstered Otis' business in the Far East, and Otis gained share in the important Japanese market.

In Europe, Otis continued to maintain its level of bookings, with some market share gains in the face of a downward drifting market. In Latin America, total elevator industry bookings were down significantly, but Otis held its leadership position. Maintenance and retrofit activities are generating solid business even in depressed markets.

Essex Maintains U.S. Market Share

Essex's sales increased substantially to almost \$900 million in 1983 as a result of the full-year inclusion of Isola, a European company acquired in 1982, and higher volume in the United States. Earnings rose moderately in the United States but declined sharply in the depressed European market.

In building wire and cable, Essex was able to maintain the market share increases achieved in 1982 despite aggressive competition, thereby posting a unit volume increase.

The new Franklin, Tennessee plant, which uses the most advanced techniques in the industry to draw, insulate, and cure magnet wire in one continuous operation, tested well during the year. This low-cost production approach should strengthen Essex's position in magnet wire.

Building Systems Company Expands

Much was accomplished in 1983 at Building Systems Company, although it operated at a loss because of start-up investments and heavy price cutting in some private branch exchange (PBX) telephone markets. In two years, Building Systems has grown from three to about 2,500 people. Losses are expected to remain high in 1984 as Building Systems begins numerous projects.

Building Systems' first four "intelligent" buildings are nearing completion — for Aetna's Cityplace in Hartford, Citibank in San Francisco, LTV in Dallas, and Tower 49 in New York.

Building Systems won several new projects across the country to integrate building hardware and software with an electronic system for efficient operation. It also booked modernization contracts to retrofit existing buildings. During the year, Building Systems acquired The Headquarters Companies, which provide clients nationwide with ready-to-use executive suites and support services. It supplements Building Systems' office automation capabilities, which include such tenant services as electronic mail and teleconferencing.

In 1983, Building Systems reorganized and streamlined its telecom sales and service arm (United Technologies Communications Company), reducing administrative personnel in its sales and service operation by 78 while increasing the sales force by 20%. Orders and production of its Lexar PBX telephone equipment increased steadily. Building Systems also moved into a specialty niche of the PBX market with a hotel/motel phone. The newly opened Orlando Hilton was the first installation of this high-technology telephone system, which manages such functions as long distance call routing and accounting, air conditioning and heating, television, emergency call-up, smoke detection reporting, room security, direct access to hotel services, and data communications.

United Technologies' Defense Group was formed in 1983 to better serve the military market. It consists of the Sikorsky helicopter and Norden Systems electronic businesses. Sales advanced 21% to \$1.9 billion and earnings also rose.

Sikorsky Expands Market Share

Sikorsky, now clearly the world leader in the helicopter industry, posted record sales in 1983 of \$1.3 billion.

On the military side, the Black Hawk, which remains in rate production for the U.S. Army, was joined by the Seahawk version for the U.S. Navy. Twenty Super Stallion transport helicopters were delivered to the Marines and Navy in 1983, and the prototype of the minesweeper version was completed.

In 1983, effective overseas marketing efforts resulted in Sikorsky's first foreign orders for Black Hawks and the militarized version of the commercial S-76.

On the commercial side, sales of the executive version S-76 Mark II rose strongly, bringing the number of S-76 corporate operators to 45. The offshore oil market remained depressed.

Sikorsky announced plans to build a plant in Alabama to produce components made from composite compounds — strong, lightweight, fiber-reinforced materials used as substitutes for metal parts. Over the next five years, Sikorsky expects to quadruple its use of composites. The new plant also will supply aerospace manufacturers and other United Technologies' divisions.

Excellent Performance at Norden

Norden Systems finished 1983 with record sales. The company has maintained an excellent record for on-time delivery as well as good profitability, while managing its rapid growth.

Six international contracts were received in 1983 as a result of Norden's marketing thrust abroad. Norden also expanded its fully militarized computer line and received the first order for its MIL-VAX computer for use in the new Milstar Satellite communications system. In addition, program applications for the existing PDP-11/M militarized computers showed continued growth.

Norden's Chemical Systems Division won two major missile propulsion contracts — the third-stage motors for the Air Force's Minuteman II and the Navy's Trident II.

Sales of United Technologies' newly formed Industrial Group rose 14% to almost \$1.8 billion in 1983. Results were buoyed by the recovery of North American car and truck production to 10.7 million units. European automotive production increased about 5%. Profits of the group more than doubled year to year.

Good Year for Inmont

Inmont recorded steady gains in sales and earnings. With the resurgence in United States car production, automotive paint sales increased to original equipment manufacturers, such as General Motors. Inmont enhanced its position in the important new basecoat/clearcoat finishing system with its work on the new Corvette. Inmont also increased its share in the automotive paint aftermarket, helped by the introduction of a new product, Miracryl 2, an especially fast-drying refinish enamel.

Although demand for printing ink grew slowly, the company made increased profits by lowering its cost base. Inmont also strengthened its position in the European printing ink business through the acquisition of the Hartmann Group. This provided an entry into West Germany and increased Inmont's share in France.

Automotive Sales Rebound

The increase in North American and European car production enabled the Automotive unit to increase sales and earnings. It is the leading independent manufacturer of wire harnesses in North America and Europe and also gained share in electro-mechanical products. In addition, Ford conferred its highest quality rating to five Automotive plants, making United Technologies second among Ford suppliers in such awards.

Sales of diesel fuel injection systems for heavy-duty vehicles remained depressed, although orders strengthened late in 1983. Expansion of the diesel market for cars and light trucks appears further in the future than expected. Consequently, management shifted development of electronic diesel systems to heavy-duty vehicles. A key part of Automotive's drive to reduce costs and increase margins is its new automated plant in South Carolina, now in operation.

Automotive's Steelweld Robotics Systems received its first major United States contract in 1983 from Ford to supply 25 robots for spot-welding vehicle bodies.

Controls Unit Expands

United Technologies' Controls Group was formed in 1983. Despite the depression in the commercial aerospace industry, sales rose to over \$800 million because of new projects and growth in its military business. Late in 1983, demand began to improve in the industrial and appliance controls arena. To increase Controls' worldwide presence in aerospace products, Nord-Micro Elektronik of West Germany and its affiliate, Microtecnica of Italy, were acquired. Their product lines are represented in many major European aerospace programs.

During the year, Hamilton Standard's family of electronic engine controls successfully met operational and flight testing on a variety of aircraft, such as the 767 and A310, and development work began on controls for Pratt & Whitney's new PW4000 engine. Hamilton began deliveries of advanced lightweight, fuel-efficient propellers for virtually all the new-generation 30-50 passenger commuter planes, as well as environmental systems and engine controls. Hamilton's advanced work on its highly energy-efficient propfan attracted wide industry attention.

Hamilton Test Systems buttressed its position as the nation's leading supplier of computerized auto emissions inspection equipment when it added two more states to the list of state programs it manages. In 1983, the company tested more than 10 million vehicles across the country.

Mostek Moves Forward

The Mostek semiconductor subsidiary approached breakeven for all of 1983. Industry demand firmed in 1983, and Mostek did an outstanding job of bringing costs down. At the same time, it is investing heavily to reduce its reliance on the volatile memory market by diversifying its product line toward such areas as microprocessor peripherals, semicustom chips, and telecommunication circuits. Mostek's objective is to increase nonmemory products as a proportion of sales over the next several years.

Mostek became the leading merchant producer of 64K Random Access Memories in the U.S., ranking among the top four in the world; 1983 shipments totaled about 41 million units, up from six million in 1982. Mostek announced its entry into the 256K Dynamic Random Access Memory market in August and will begin production in 1984.

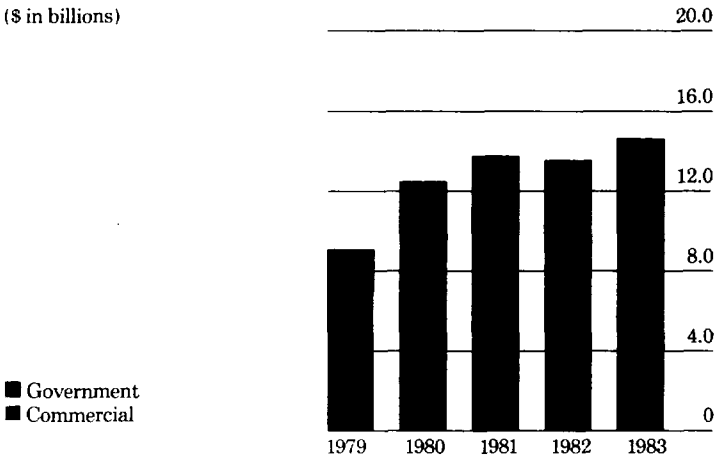
United Technologies enlarged its European electronics interest in 1983 when its joint venture in West Germany with AEG-Telefunken GmbH, called TEG, began a venture with the Diehl Group to develop, produce, and market complementary metal/oxide semiconductor (CMOS) circuits through a joint company, EUROSIL Electronic GmbH. Mostek, TEG and EUROSIL are significant participants in the European semiconductor market with over \$200 million in sales.

'83

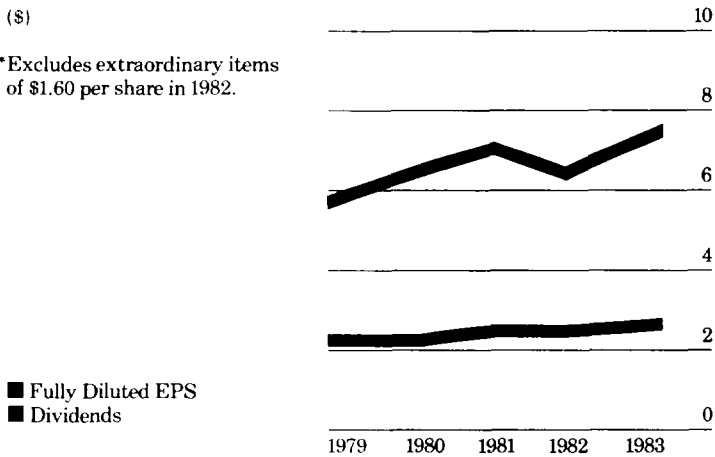
Financial Summary



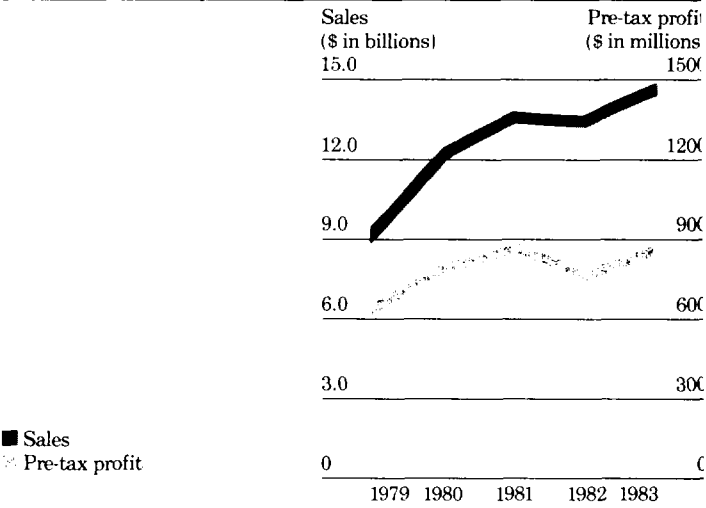
Sales



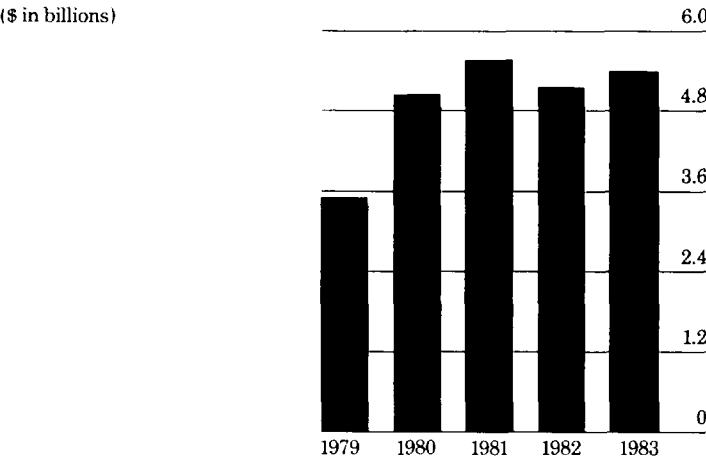
Earnings* and Dividends per Share on Common Stock



Sales and Pre-tax Profit



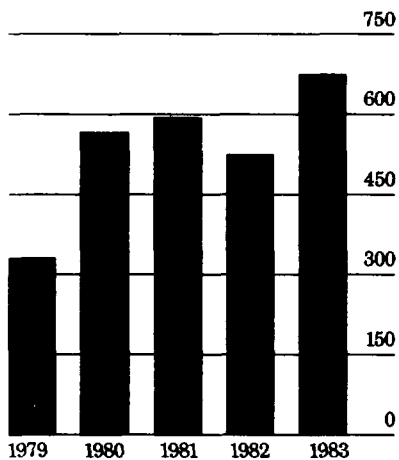
Sales in International Markets



Originals in color.

Capital Expenditures

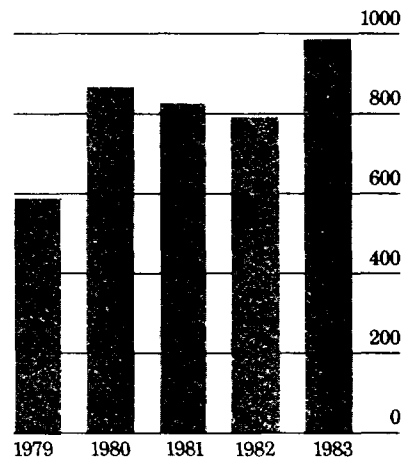
(\$ in millions)



Total Funds Generated by Operations*

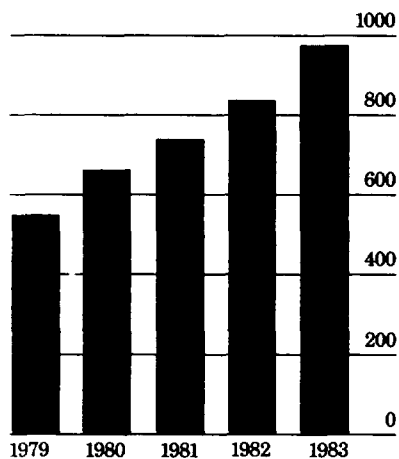
(\$ in millions)

*See Consolidated Statement of Changes in Financial Position.



Company-Funded R&D Expenditures

(\$ in millions)

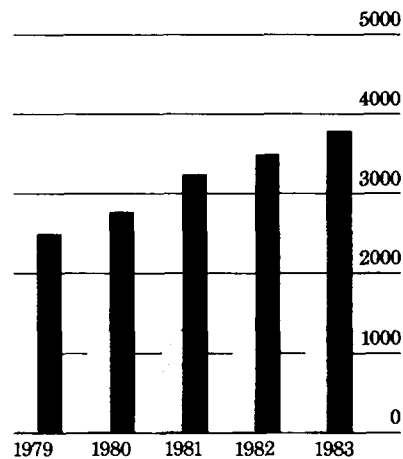


Total Debt* to Equity

(\$ in millions)

*Short-term and Long-term debt.

Debt
■ Equity



Five-Year Summary

United Technologies Corporation

Dollars in Thousands (except per share amounts)

	1983	1982	1981	1980	1979
For the Year:					
Sales	\$14,669,265	\$13,577,129	\$13,667,758	\$12,323,994	\$9,053,358
Percent to United States Government	33%	33%	28%	22%	23%
Cost of goods and services sold	\$10,768,274	\$ 9,956,151	\$10,081,262	\$ 9,038,161	\$6,542,480
Research and development	\$ 970,790	\$ 834,476	\$ 735,825	\$ 660,296	\$ 545,471
Selling, service and administrative	\$ 2,013,874	\$ 1,916,892	\$ 1,827,256	\$ 1,684,046	\$1,281,303
Interest expense	\$ 208,573	\$ 250,886	\$ 244,839	\$ 229,848	\$ 138,589
Income taxes	\$ 335,104	\$ 318,244	\$ 402,691	\$ 373,844	\$ 284,050
Income before extraordinary item and cumulative effect of change in accounting principle—1982		\$ 426,874			
Net income	\$ 509,173	\$ 533,721	\$ 457,686	\$ 393,383	\$ 325,608
Preferred Stock dividend requirement	\$ 66,824	\$ 69,570	\$ 76,835	\$ 81,239	\$ 55,562
Earnings applicable to common stock	\$ 442,349	\$ 464,151	\$ 380,851	\$ 312,144	\$ 270,046
Earnings per share:					
Income before extraordinary item and cumulative effect of change in accounting principle—1982:					
Primary		\$ 6.73			
Fully diluted		\$ 6.41			
Net Income:					
Primary	\$ 7.94	\$ 8.74	\$ 7.71	\$ 7.28	\$ 6.49
Fully diluted	\$ 7.48	\$ 8.01	\$ 7.05	\$ 6.51	\$ 5.71
Cash dividends on common stock	\$ 141,241	\$ 127,265	\$ 118,136	\$ 94,447	\$ 91,699
Per share	\$ 2.55	\$ 2.40	\$ 2.40	\$ 2.20	\$ 2.20
Average number of shares of Common Stock outstanding:					
Primary	55,716,995	53,104,845	49,402,486	42,855,312	41,625,259
Fully converted	68,101,010	66,616,320	64,958,277	60,138,481	55,510,920
Total funds generated by operations (cash flow)*	\$ 990,356	\$ 789,998	\$ 824,691	\$ 866,503	\$ 591,758
Capital expenditures	\$ 674,818	\$ 528,353	\$ 591,192	\$ 569,088	\$ 331,175
Depreciation	\$ 372,456	\$ 325,811	\$ 277,630	\$ 226,298	\$ 155,989
Salaries and wages	\$ 4,158,879	\$ 3,928,648	\$ 3,859,152	\$ 3,635,329	\$2,894,122
Return on sales, after tax	3.5%	3.1%**	3.3%	3.2%	3.6%
Asset turnover (sales/assets)	1.83	1.77	1.86	1.85	1.85
Return on assets, after tax	6.3%	5.6%**	6.2%	5.9%	6.6%
Return on equity, after tax	14.0%	12.8%**	15.0%	14.9%	15.1%

*See Consolidated Statement of Changes in Financial Position, page 25 of this Annual Report.

** Income before extraordinary item and cumulative effect of change in accounting principle.

Five-Year Summary

United Technologies Corporation

Dollars in Thousands (except per share amounts)

	1983	1982	1981	1980	1979
At Year End:					
Net working capital	\$ 1,645,600	\$ 1,554,104	\$ 1,573,982	\$ 1,359,139	\$ 1,480,024
Current asset ratio	1.5 to 1	1.5 to 1	1.5 to 1	1.4 to 1	1.6 to 1
Total assets	\$ 8,720,059	\$ 7,993,376	\$ 7,555,103	\$ 7,336,016	\$ 6,468,806
Short-term borrowings	\$ 398,149	\$ 449,391	\$ 392,762	\$ 663,548	\$ 436,473
Long-term debt	\$ 929,133	\$ 982,333	\$ 906,776	\$ 892,843	\$ 944,875
Debt to total capitalization	26%	29%	29%	36%	36%
Net worth	\$ 3,783,755	\$ 3,481,790	\$ 3,212,511	\$ 2,734,853	\$ 2,487,156
Common shareowners' equity	\$ 3,253,897	\$ 2,775,784	\$ 2,445,910	\$ 1,864,827	\$ 1,599,860
Equity per common share	\$ 54.43	\$ 51.12	\$ 47.14	\$ 42.71	\$ 37.99
Unfilled orders	\$12,100,000	\$11,700,000	\$11,650,000	\$11,400,000	\$10,500,000
Number of employees:					
United States	122,300	120,200	124,700	136,200	136,500
International					
Europe	34,900	32,500	30,000	28,000	28,500
Other	36,500	31,200	35,000	36,000	32,700
Total	193,700	183,900	189,700	200,200	197,700
Number of shareowners	68,500	77,400	81,500	86,600	88,200

Notes: Effective January 1, 1982, the Corporation changed its method of accounting for investment tax credits from the deferral method to the flow-through method. Net income for 1982 includes \$66.6 million (\$1.25 primary earnings per share and \$1.00 fully diluted earnings per share) cumulative effect of this change in accounting principle. Pro forma amounts for the years 1979 through 1981, assuming retroactive application of the accounting change, are: net income for 1981 - \$473.6 million, 1980 - \$408.3 million and 1979 - \$331.4 million; primary earnings per share for 1981 - \$8.03, 1980 - \$7.63 and 1979 - \$6.63; and fully diluted earnings per share for 1981 - \$7.29, 1980 - \$6.76 and 1979 - \$5.81. See Note 2 of Notes to Financial Statements.

In June 1982, the Corporation reacquired \$165 million of debentures in exchange for cash and 1,919,311 shares of Common Stock resulting in an extraordinary gain of \$40.2 million (\$.76 primary earnings per share and \$.60 fully diluted earnings per share). See Note 4 of Notes to Financial Statements.

Effective January 1, 1981 the Corporation adopted the provisions of Statement of Financial Accounting Standard No. 52, "Foreign Currency Translation." The principal effect of FAS No. 52 has been that most of the large foreign exchange translation losses which have resulted from the strengthening of the U.S. dollar in 1981, 1982 and 1983 have been deferred as a component of Shareowners' Equity, and accordingly did not affect reported earnings. The portion of the net exchange losses deferred as a component of Shareowners' Equity in 1981, which would have been charged against income under the previously effective Financial Accounting Standard, amounted to \$42,706,000, net of income tax effects, equivalent to \$.86 primary earnings per common share, or \$.66 per share on a fully diluted basis. See Note 6 of Notes to Financial Statements.

Primary earnings per share are based on the average number of shares of Common Stock outstanding during each year. Fully diluted earnings per share reflect the maximum dilution of per share earnings which would have occurred if all of the dilutive convertible securities of the Corporation had been converted on the dates of issue.

Equity per common share is based on shares outstanding at each year end.

The consolidated results of operations include Carrier Corporation from July 1, 1979 and Mostek Corporation from November 1, 1979.

Management's Discussion and Analysis of Results of Operations and Financial Position

The following discussion and analysis sets forth certain factors which produced changes in the Corporation's results of operations during the three years ended December 31, 1983, and comments on the Corporation's financial position at that date as presented in the accompanying financial statements. Operating results of the Corporation's business segments, reportable in accordance with Financial Accounting Standard No. 14, are shown in the Consolidated Summary of Business Segment Financial Data on pages 39 through 41 of this Annual Report. Attention is drawn to Notes 2, 4 and 6 of Notes to Financial Statements regarding the effects of the change in method of accounting for investment tax credits and the extraordinary gain from the reacquisition of long-term debt in exchange for cash and Common Stock, both in 1982, and the adoption of Financial Accounting Standard No. 52, "Foreign Currency Translation," in 1981.

In addition to the factors noted below, continuing economic inflation drove up material prices, employee compensation and other costs, and the Corporation's selling prices to customers, although to a lesser extent in 1983 and 1982 than in earlier years. Data which may be helpful in assessing the impact of inflation is set forth in Note 18, "Changing Prices," in the accompanying financial statements.

Results of Operations

Sales:

increased 8% or \$1.1 billion from 1982 to 1983;
decreased 1% or \$0.1 billion from 1981 to 1982.

It is estimated that increases in selling prices to customers averaged 3% in 1983, indicating that the increase in real volume of sales was approximately 5%. While the indicated decrease in consolidated sales was 1% from 1981 to 1982, it is estimated that increases in selling prices to customers averaged 6% in 1982, indicating that the decrease in real volume of sales in 1982 was approximately 7%, due to the business recession and other factors discussed below.

Sales of the Corporation's principal business segments for the three years ended December 31, 1983 were:

In Millions of Dollars	1983	1982	1981
Power	\$5,146.1	\$5,271.6	\$5,566.7
Flight Systems	\$2,321.9	\$1,996.8	\$1,656.7
Building Systems	\$3,950.4	\$3,683.8	\$3,741.6
Industrial Products for the Automotive, Electronics and Other Industries	\$3,156.2	\$2,524.9	\$2,587.6

Power sales decreased by \$125.5 million, or 2% in 1983 from the preceding year and decreased by \$295.1 million, or 5%, in 1982. Sales of military engines and spare parts decreased approximately 2% in 1983, compared to an increase of 10% in 1982. Sales to the commercial airline market increased approximately 7% in 1983 but the increase resulted primarily

from shipment of aircraft engines early in 1983 which had been ordered up to two years earlier, and not from any general recovery in the commercial airline market. In 1982, sales of engines and spare parts in that market were down approximately 19%, compared to 1981, due to airline overcapacity and financial constraints, decreased production of aircraft with the Corporation's JT8D engine, the effect upon spare parts sales of reduced airline operations, and the general recession. Sales of engines and spare parts for the general aviation market were down 14% in 1983 from the preceding year, and 32% in 1982, due to the business recession.

Flight Systems sales increased by \$325.1 million, or 16%, for 1983 and \$340.1 million, or 21%, for 1982. These increases resulted from higher sales of military helicopters and spare parts, and other aircraft products. Sales of commercial helicopters were down significantly in 1982, due to unfavorable conditions in the markets for such aircraft which continued in 1983.

In 1983, Building Systems segment revenues increased 7%, or \$266.6 million, due to increases in sales in the air-conditioning business and in sales from new businesses in the Building Systems Company subsidiary. Building Systems segment revenues decreased \$57.8 million, or 2%, for 1982, the net effect of a decrease in air-conditioning sales, reflecting depressed economic conditions in the construction industry, and an increase in the elevator business. Building Systems segment revenues were adversely affected in 1982 and again in 1983 to the extent of approximately \$263 million and \$187 million, respectively, from the translation of sales of foreign subsidiaries at less favorable foreign exchange rates than in the preceding year, after adjusting for the estimated effect upon the exchange rates of local inflation in highly inflationary countries.

Revenues related to Industrial Products improved with the business recovery in 1983. Sales were up 25%, or \$631.3 million, principally as a result of higher sales to the automotive industry and increased sales of wire and cable and semiconductor products. Revenues related to Industrial Products were down 2%, or \$62.7 million, in 1982 from 1981 as the result of lower sales of automotive and semiconductor products, principally due to the business recession.

Other income, net, increased:

9% or \$12.5 million from 1982 to 1983;
44% or \$42.2 million from 1981 to 1982.

The increase in 1983 was attributable to higher interest income, and proceeds from the discontinued use of a trade name, less a net reduction in other items. The increase in 1982 was due to lower foreign exchange losses charged against other income and an increase in commission income. Also included was a gain, not material in amount, from the sale in the second quarter of 1982 of the Corporation's Jenn-Air subsidiary.

The Corporation adopted Financial Accounting Standard No. 52, "Foreign Currency Translation," effective January 1, 1981. Pursuant to that Standard, net foreign exchange losses on certain transactions and on operations in highly inflationary economies of \$6.2 million in 1983, \$7.0 million in 1982 and \$12.1 million in 1981 were included in other income. The principal effect of the adoption of FAS No. 52 has been that most of the

large foreign exchange translation losses which have resulted from the strengthening of the U.S. dollar against foreign currencies in 1981, 1982 and 1983 have been deferred as a component of Shareowners' Equity, and accordingly did not affect reported earnings. (See Note 6 of Notes to Financial Statements.)

Research and development expenses increased:

16% or \$136.3 million from 1982 to 1983;

13% or \$98.7 million from 1981 to 1982.

The rise in research and development expenses in both years was due principally to higher expenditures in the Power segment on advanced engine models. Expenditures in that segment are expected to increase further in 1984 because of continuing large expenditures for the development of the PW2037 engine and the PW4000 engine series.

Selling, service and administrative expenses increased:

5% or \$97.0 million from 1982 to 1983;

5% or \$89.6 million from 1981 to 1982.

Selling, service and administrative expenses increased in both years as a result of generally higher salaries and wages and other expenses.

Interest expense:

decreased 17% or \$42.3 million from 1982 to 1983;

increased 2% or \$6.0 million from 1981 to 1982.

Interest expense in 1983 was \$208.6 million. The decrease from 1982 reflects both lower average borrowings and reduced short-term interest rates. Interest expense in 1982 was \$250.9 million. The increase over 1981 was due to substantially higher average short-term borrowings partially offset by a reduction in short-term interest rates in the latter part of the year. The weighted average interest rate paid on the Corporation's short-term borrowings in 1983 was 11.4% (13.0% in 1982 and 16.3% in 1981) and the average composite rate for short-term borrowings and long-term debt for 1983 was 11.1% (11.5% for 1982 and 12.7% for 1981). The average rate applicable to debt outstanding at December 31, 1983 was 13.1% for the short-term borrowings, and the average composite rate including long-term debt was 10.8%.

Operating profit:

increased 6% or \$50.6 million from 1982 to 1983;

decreased 15% or \$151.7 million from 1981 to 1982.

Operating profits of the Corporation's principal business segments for the three years ended December 31, 1983 were:

In Millions of Dollars	1983	1982	1981
Power	\$301.4	\$420.4	\$596.4
Flight Systems	\$198.2	\$169.3	\$105.5
Building Systems	\$272.0	\$257.1	\$285.2
Industrial Products for the Automotive, Electronics and Other Industries	\$159.6	\$ 34.5	\$ 34.5

In the Power segment, the decreases in operating profit of \$119.0 million, or 28%, for 1983 and \$176.0 million, or 30%, for 1982, occurred mainly in the Corporation's commercial airline engine and spare parts business, and to a lesser extent in the general aviation engine business. They were due to the sharply reduced level of sales of engines and spare parts in those markets beginning in 1982, referred to above, together with increasingly higher levels of commercial engine research and development and engine certification costs in both years, higher fleet introductory assistance costs in 1983, and loss provisions in 1982 of approximately \$25 million related to the bankruptcy of a major airline.

Operating profit gains of \$28.9 million, or 17%, and \$63.8 million, or 60%, for 1983 and 1982, respectively, in the Flight Systems segment reflect the higher sales referred to above and, from 1982 onward, substantially improved profitability in the Corporation's military helicopter business.

The increase in operating profit of the Building Systems segment in 1983 of \$14.9 million, or 6%, reflects the higher sales in the air-conditioning business, noted above, partially offset by the effects of less favorable exchange rates than in the prior year for the translation of foreign subsidiaries' earnings, and losses related to new businesses and products in the Building Systems Company subsidiary. In 1982, lower sales of air-conditioning equipment, together with less favorable foreign exchange rates and losses of the Building Systems subsidiary, partially offset by improved volume and gross margins in the elevator business, caused the decrease in operating profit of \$28.1 million, or 10%, from the prior year.

In the Industrial Products segment, operating profits increased \$125.1 million, or 363%, in 1983 reflecting the significant recovery in sales to the automotive industry referred to above, together with improved sales and operating results in the segment's semiconductor business. Since early 1981 the semiconductor industry had been experiencing conditions of low customer demand, overcapacity and intense price competition, which together with costs of new product development, resulted in operating losses in that business. A major restructuring program was undertaken which significantly reduced the semiconductor losses in the second half of 1982, and in 1983 there was significant improvement in customer demand and selling prices in the industry. As a result, the segment's semiconductor operations approached break-even in 1983. There had been a significant downturn in operating profit of the segment's automotive business in 1982 due to the depressed condition of the automotive industry, and to costs of new product development; substantial improvement was recorded in 1983. Operating profits of the segment's wire and cable business were at a low level in 1983 and 1982, compared to 1981, due to the business recession.

As a net result of the aforementioned, pretax income from operations:

increased 13.4% or \$101.5 million from 1982 to 1983;

decreased 13% or \$117.7 million from 1981 to 1982.

The effective income tax rate for U.S. federal, state and foreign income taxes was 39% for 1983, compared to 42% in 1982. The reduction in effective tax rate resulted from higher

U.S. tax credit for qualified research expenditures, and other factors. The reduction in effective tax rate to 42% in 1982 compared to 46% in 1981 resulted primarily from the change to the flow-through method of accounting for the investment tax credits (see Note 2 of Notes to Financial Statements) and from the effect of the U.S. tax credit for qualified research expenditures.

Net income:

decreased 5% or \$24.5 million from 1982 to 1983;
increased 17% or \$76.0 million from 1981 to 1982.

Net income for 1982 included the cumulative effect of a change in accounting method for investment tax credits, which increased net income by \$66.6 million, and an extraordinary gain of \$40.2 million from the reacquisition of \$165 million principal amount of the Corporation's debentures in exchange for cash and Common Stock. See Notes 2 and 4 of Notes to Financial Statements for an explanation of these matters, and see the Consolidated Statement of Income which presents their impact on net income and earnings per share of Common Stock. Net income from operations (excluding the 1982 effect of the change in accounting method and extraordinary gain) increased from 1982 to 1983 by \$82.3 million, or 19%.

Financial Position

Management assesses the Corporation's liquidity in terms of its overall ability to mobilize cash to fund its operations. Of particular importance in the management of liquidity are funds generated by operations; levels of accounts receivable, inventories and fixed asset additions; adequate bank lines of credit; and financial flexibility to attract long-term capital on satisfactory terms.

The following tabulation summarizes, from the Consolidated Statement of Changes in Financial Position for the three years ended December 31, 1983, the funds generated by the Corporation's operations (net income adjusted for items not currently requiring or providing cash), and other sources and requirements for cash to meet operating needs including working capital and fixed asset expenditures.

In Millions of Dollars	1983	1982	1981
Funds generated by operations	\$990	\$ 790	\$ 825
(Increases) decreases in:			
Current and long-term receivables	(116)	(77)	19
Inventories	(127)	(134)	46
Investments	(28)	(109)	8
Fixed asset additions, net	(625)	(577)	(557)
Changes in accounts payable and accruals	351	77	(77)
Other	(80)	(32)	(69)
Net funds provided by (used for) operating transactions	\$365	\$ (62)	\$ 195

Accounts receivable and inventories increased an aggregate \$454 million or 10% in 1983 and 1982. The increases resulted in part from the inclusion of businesses acquired during those years (none of which was material to the Corporation's business), as well as to increasing sales levels in most of the Corporation's business segments. High levels of accounts receivable and inventories are expected to continue through 1984, and their level will be affected by the business conditions, including the extent of further economic recovery and inflation rates, in the businesses in which the Corporation operates.

The substantial fixed asset additions during the period 1981 through 1983, shown above, have been necessary to increase productivity, to keep the Corporation's facilities modern, and to provide for expansion of some product lines. Fixed asset expenditures are expected to increase in 1984 by as much as 25% over 1983.

As indicated in the foregoing tabulation, funds generated by operations aggregated \$2,605 million for the three years ended December 31, 1983, and were available for the substantial working capital and fixed asset requirements during that period. Other financial requirements during the period included maturing long-term debt of \$155 million, purchases of the Corporation's convertible preferred stock which aggregated \$57 million in 1981 and 1982, and dividends to preferred and common shareowners. Cash of \$63 million was also required for the June 1982 exchange of cash and Common Stock for \$165 million of the Corporation's outstanding long-term debentures, which was undertaken in order to take advantage of the substantial discounts at which the debentures were trading.

To meet its net financing requirements indicated above, during the three years ended December 31, 1983 the Corporation increased its short-term borrowings as required, issued new long-term debt when conditions were considered favorable, and in March 1981 sold 5,000,000 shares of its Common Stock in a public offering, realizing \$258 million which was used to reduce short-term borrowings. The results of the foregoing activities upon the Corporation's financial structure are shown in the following tabulation:

In Millions of Dollars – December 31	1983	1982	1981
Short-term borrowings	\$ 398	\$ 449	\$ 393
Long-term debt	\$ 929	\$ 982	\$ 907
Shareowners' equity	\$3,784	\$3,482	\$3,213
Debt to total capitalization	26%	29%	29%

The ratio of debt to total capitalization is of particular significance as an indicator of the Corporation's potential ability to utilize the markets for short-term and long-term debt on favorable terms. Management considers a debt to total capitalization ratio not in excess of 35% to be satisfactory, although a substantially lower ratio is desirable.

In addition to the funds requirements discussed above, the Corporation's finance subsidiaries had financing commitments to customers at December 31, 1983 of approximately \$425 million, of which \$125 million is expected to be disbursed in 1984.

At December 31, 1983, the Corporation had bank credit lines totaling \$2.0 billion, of which \$3 million had been borrowed and \$340 million served as informal backup for outstanding commercial paper of the Corporation and its unconsolidated finance subsidiaries. The balance of the bank credit lines, \$1.6 billion, is available for further borrowings, as needed. Long-term debt and equity offerings also will be considered in the future if conditions in the securities markets make such

offerings advantageous, and in that regard Registration Statements had been filed with the Securities and Exchange Commission at December 31, 1983 under which up to \$200 million of long-term debt of the Corporation, and up to \$150 million of long-term debt of UT Credit, might be issued.

Management believes that available sources of funds, indicated above, should be adequate to meet its presently foreseeable cash requirements.

Comparative Stock Data

United Technologies Corporation

	1983			1982		
	High	Low	Dividend	High	Low	Dividend
Common Stock						
First Quarter	70¾	53¾	\$.60	43¾	31¼	\$.60
Second Quarter	76¾	66¾	.65	40¾	35	.60
Third Quarter	73½	64	.65	50½	36½	.60
Fourth Quarter	73½	63¾	.65	58¾	45¾	.60
\$2.55 Preferred Stock						
First Quarter	33	27	\$.6375	21¾	19½	\$.6375
Second Quarter	36¼	32½	.6375	22¾	20¾	.6375
Third Quarter	35¾	31¼	.6375	25	21¾	.6375
Fourth Quarter	33½	31¼	.6375	28¾	24¾	.6375
\$8.00 Preferred Stock						
First Quarter	306	271	\$2.00	187½	140	\$2.00
Second Quarter	319	310	2.00	172¾	132¾	2.00
Third Quarter	317½	307	2.00	215	175½	2.00
Fourth Quarter	310	309	2.00	248	219	2.00

The Corporation's Common and \$2.55 and \$8.00 Preferred Stocks are listed on the New York Stock Exchange.

The high and low prices are based on the Composite Tape.

The number of shareowners of record at December 31, 1983 were: Common Stock — 45,996, \$2.55 Preferred Stock — 20,450 and \$8.00 Preferred Stock — 1,552.

Management's Responsibility for Financial Statements

The financial statements of United Technologies Corporation and consolidated subsidiaries, and all other information presented in this Annual Report, are the responsibility of the management of the Corporation. The financial statements have been prepared in accordance with generally accepted accounting principles, consistently applied except for the accounting change described in Note 2 of Notes to Financial Statements, with which our independent accountants concur.

Management is responsible for the integrity and objectivity of the financial statements, including estimates and judgments reflected in them. It fulfills this responsibility primarily by establishing and maintaining accounting systems and practices adequately supported by internal accounting controls. These controls include the selection and training of management and supervisory personnel; an organization structure providing for delegation of authority and establishment of responsibilities; communication of requirements for compliance with approved accounting, control and business practices throughout the organization; business planning and review; and a program of internal audit. Management believes the internal accounting controls in use provide reasonable assurance that the Corporation's assets are safeguarded, that transactions are executed in accordance with management's authorizations, and that the financial records are reliable for the purpose of preparing financial statements.

Independent accountants are elected annually by the Corporation's shareowners to examine the financial statements in accordance with generally accepted auditing standards. Their report appears in this Annual Report. Their examinations, as well as those of the Corporation's internal audit department, include a review of internal accounting controls and selective tests of transactions.

The Audit Review Committee of the Board of Directors, consisting of six directors who are not officers or employees of the Corporation, meets regularly with management, the independent accountants and the internal auditors, to review matters relating to financial reporting, internal accounting controls and auditing.

Report of Independent Accountants

To the Shareowners of United Technologies Corporation

In our opinion, the accompanying consolidated balance sheet and the related consolidated statements of income, changes in shareowners' equity and of changes in financial position present fairly the financial position of United Technologies Corporation and its subsidiaries at December 31, 1983 and 1982, and the results of their operations and the changes in their financial position for each of the three years in the period ended December 31, 1983, in conformity with generally accepted accounting principles consistently applied during the period except for the change, with which we concur, in the method of accounting for investment tax credits as described in Note 2 of Notes to Financial Statements. Our examinations of these statements were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

Price Waterhouse

One Financial Plaza
Hartford, Connecticut
January 25, 1984

Consolidated Statement of Income

United Technologies Corporation

In Thousands of Dollars (except per share amounts)	Years Ended December 31,		
	1983	1982	1981
Revenues:			
Sales	\$14,669,265	\$13,577,129	\$13,667,758
Other income, less other deductions	151,487	139,000	96,839
	\$14,820,752	\$13,716,129	\$13,764,597
Costs and Expenses:			
Cost of goods and services sold	\$10,768,274	\$ 9,956,151	\$10,081,262
Research and development	970,790	834,476	735,825
Selling, service and administrative expenses	2,013,874	1,916,892	1,827,256
Interest expense	208,573	250,886	244,839
	\$13,961,511	\$12,958,405	\$12,889,182
Income before income taxes	\$ 859,241	\$ 757,724	\$ 875,415
Income taxes	335,104	318,244	402,691
Income before minority interests	\$ 524,137	\$ 439,480	\$ 472,724
Less – Minority interests in subsidiaries' earnings	14,964	12,606	15,038
Income before extraordinary item and cumulative effect of change in accounting principle	\$ 509,173	\$ 426,874	\$ 457,686
Extraordinary gain	—	40,226	—
Cumulative effect of change in accounting principle	—	66,621	—
Net Income	\$ 509,173	\$ 533,721	\$ 457,686
Preferred Stock Dividend Requirement	\$ 66,824	\$ 69,570	\$ 76,835
Earnings Applicable to Common Stock	\$ 442,349	\$ 464,151	\$ 380,851
Per Share of Common Stock:			
Primary:			
Income before extraordinary item and cumulative effect of change in accounting principle	\$7.94	\$6.73	\$7.71
Extraordinary gain	—	.76	—
Cumulative effect of change in accounting principle	—	1.25	—
Net Income	\$7.94	\$8.74	\$7.71
Fully Diluted:			
Income before extraordinary item and cumulative effect of change in accounting principle	\$7.48	\$6.41	\$7.05
Extraordinary gain	—	.60	—
Cumulative effect of change in accounting principle	—	1.00	—
Net Income	\$7.48	\$8.01	\$7.05
Pro forma assuming retroactive application of change in accounting principle:			
Income before extraordinary item	\$ 509,173	\$ 426,874	\$ 473,580
Per Share of Common Stock			
Primary earnings	\$7.94	\$6.73	\$8.03
Fully diluted earnings	\$7.48	\$6.41	\$7.29
Net Income	\$ 509,173	\$ 467,100	\$ 473,580
Per Share of Common Stock			
Primary earnings	\$7.94	\$7.49	\$8.03
Fully diluted earnings	\$7.48	\$7.01	\$7.29

See accompanying Notes to Financial Statements

Consolidated Balance Sheet

United Technologies Corporation

In Thousands of Dollars	December 31,	
	1983	1982
Assets		
Current Assets:		
Cash and short-term cash investments	\$ 231,793	\$ 121,471
Accounts receivable	1,721,830	1,552,304
Inventories and contracts in progress	4,907,227	4,968,588
Less — Progress payments and billings on contracts in progress	(1,914,582)	(2,102,596)
Prepaid expenses	72,298	64,005
Total Current Assets	\$5,018,566	\$4,603,772
Accounts and notes receivable due after one year	\$ 105,918	\$ 152,388
Unconsolidated subsidiaries and other investments	\$ 336,365	\$ 298,436
Fixed Assets, at cost:		
Land	\$ 160,254	\$ 137,917
Buildings and improvements	1,472,251	1,360,570
Machinery, tools and equipment	3,087,661	2,800,279
Under construction	349,864	242,474
	\$5,070,030	\$4,541,240
Less — Accumulated depreciation and amortization	(2,382,073)	(2,155,103)
	\$2,687,957	\$2,386,137
Deferred Charges:		
Costs in excess of net assets of acquired companies (net of amortization)	\$ 535,404	\$ 532,428
Other	35,849	20,215
	\$ 571,253	\$ 552,643
Total Assets	\$8,720,059	\$7,993,376
Liabilities and Shareowners' Equity		
Current Liabilities:		
Short-term borrowings	\$ 398,149	\$ 449,391
Accounts payable	1,068,773	871,092
Accrued salaries, wages and employee benefits	616,818	586,271
Other accrued liabilities	724,416	781,539
Long-term debt — currently due	60,165	55,153
Income taxes:		
Currently payable	197,902	101,032
Deferred	104,460	86,114
Advances on sales contracts	202,283	119,076
Total Current Liabilities	\$3,372,966	\$3,049,668
Deferred income taxes	\$ 279,308	\$ 246,261
Long-term debt	\$ 868,968	\$ 927,180
Other long-term liabilities	\$ 325,774	\$ 219,888
Commitments and contingent liabilities (Note 16)		
Minority interests in subsidiary companies	\$ 89,288	\$ 68,589
Shareowners' Equity:		
Capital Stock:		
Preferred Stock, \$1 par value (Authorized — 100,000,000 shares)		
Outstanding — 20,933,543 and 24,330,271 shares, respectively	\$ 532,278	\$ 697,774
(Aggregate liquidating preference — \$529,858,000)		
Common Stock, \$5 par value (Authorized — 200,000,000 shares)		
Outstanding — 59,783,127 and 54,299,592 shares, respectively	1,353,980	1,143,981
Deferred foreign currency translation adjustments	(199,336)	(157,666)
Retained earnings	2,096,833	1,797,701
Total Shareowners' Equity	\$3,783,755	\$3,481,790
Total Liabilities and Shareowners' Equity	\$8,720,059	\$7,993,376

See accompanying Notes to Financial Statements

Consolidated Statement of Changes in Financial Position

United Technologies Corporation

In Thousands of Dollars	Years Ended December 31,		
	1983	1982	1981
Funds provided by (used for) operating transactions:			
Net income	\$ 509,173	\$ 533,721	\$ 457,686
Items not requiring or providing cash:			
Depreciation	372,456	325,811	277,630
Amortization of goodwill	28,080	23,128	26,256
Change in deferred income taxes	53,580	49,399	75,600
Minority interests in subsidiaries' earnings	14,964	12,606	15,038
Extraordinary gain	—	(40,226)	—
Cumulative effect of change in accounting principle	—	(66,621)	—
Other	12,103	(47,820)	(27,519)
Total funds generated by operations	\$ 990,356	\$ 789,998	\$ 824,691
(Increase) decrease in current and long-term receivables	(116,456)	(76,948)	19,070
(Increase) decrease in inventories	(126,653)	(133,834)	46,335
Increase (decrease) in accounts payable and accrued liabilities	351,182	76,588	(77,024)
Additions to fixed assets, net of retirements	(624,757)	(576,871)	(557,195)
(Increase) decrease in investments	(28,286)	(108,837)	8,546
Other	(80,311)	(32,363)	(69,032)
Net Funds Provided by (Used For) Operating Transactions	\$ 365,075	\$ (62,267)	\$ 195,391
Funds provided by (used for) financing activities:			
Debt transactions:			
Issuance of long-term debt	\$ 13,103	\$ 327,275	\$ 58,348
Repayments of long-term debt	(60,977)	(200,308)	(35,200)
Increase (decrease) in short-term borrowings	(51,242)	56,629	(270,786)
Other	12,436	(80)	(4,580)
Equity transactions:			
Common Stock issued	—	65,562	258,474
Preferred Stock repurchased	—	(53,286)	(5,570)
Other	39,992	16,826	19,821
Dividends paid on Common and Preferred Stocks	(208,065)	(196,835)	(194,971)
Net Funds From (Used For) Financing Activities and Dividends	\$(254,753)	\$ 15,783	\$(174,464)
Net Increase (Decrease) in Cash and Short-Term Cash Investments	\$ 110,322	\$ (46,484)	\$ 20,927

Notes: Changes in assets and liabilities shown above include assets and liabilities acquired in business acquisitions. Such amounts were not material in the three years ended December 31, 1983.

Other equity transactions include the effects of preferred stock conversions and the issuance of stock under employee incentive plans.

See accompanying Notes to Financial Statements

Consolidated Statement of Changes In Shareowners' Equity

Three Years Ended December 31, 1983

	\$4.50 Preferred Stock
Balance December 31, 1980	\$3,470
Issued on conversion of convertible debentures (90,052 shares)	
Issued on conversion of 1,132,672 shares of Preferred Stock (2,866,517 shares)	
Issued under employee incentive plans, and related tax benefit:	
191,666 shares of Preferred Stock, net of 4,097 shares purchased and reissued	
349,962 shares of Common Stock, net of 157,905 shares purchased and reissued	
Redemption and purchase of 59,151 shares of Preferred Stock	(1,456)
Issuance of Common Stock (5,000,000 shares)	
Deferred foreign currency translation adjustments:	
Opening period adjustment	
Translation adjustments	
Income tax adjustments	
Net income	
Dividends on:	
Common Stock (\$2.40 per share)	
Preferred Stock	
Balance December 31, 1981	\$2,014
Issued on conversion of convertible debentures (32,150 shares)	
Issued on conversion of 57,642 shares of Preferred Stock (147,938 shares)	
Issued under employee incentive plans, and related tax benefit:	
94,997 shares of Preferred Stock, net of 462 shares purchased and reissued	
350,889 shares of Common Stock, net of 111,722 shares purchased and reissued	
Redemption and purchase of 2,107,247 shares of Preferred Stock	(15)
Issuance of Common Stock in exchange for debentures (1,919,311 shares)	
Deferred foreign currency translation adjustments:	
Translation adjustments	
Income tax adjustments	
Sale of foreign investments	
Net income	
Dividends on:	
Common Stock (\$2.40 per share)	
Preferred Stock	
Balance December 31, 1982	\$1,999
Issued on conversion of convertible debentures (89,456 shares)	
Issued on conversion of 3,524,735 shares of Preferred Stock (4,558,414 shares)	
Issued under employee incentive plans, and related tax benefit:	
69,015 shares of Preferred Stock, net of 6,377 shares purchased and reissued	
925,121 shares of Common Stock, net of 132,999 shares purchased and reissued	
Redemption and purchase of 30,464 shares of Preferred Stock	(30)
Deferred foreign currency translation adjustments:	
Translation adjustments	
Income tax adjustments	
Sale of foreign investments	
Net income	
Dividends on:	
Common Stock (\$2.55 per share)	
Preferred Stock	
Balance December 31, 1983	\$1,969

See accompanying Notes to Financial Statements

United Technologies Corporation

In Thousands of Dollars

Preferred Stock	Preferred Stock	Preferred Stock	Preferred Stock	Common Stock	Deferred Translation Adjustments	Retained Earnings
\$2.55	\$3.875	\$7.32	\$8.00			
\$551,657	\$187,643	\$ 95,290	\$16,556	\$ 678,591	\$ —	\$1,201,646
2,564						
(30)	(8,061)	(90,973)	(4,549)	103,475		
3,401	32	152				(10)
		(4,469)		18,189		(2,104)
				258,474		355
					(6,024)	
					(50,911)	
					(3,112)	
						457,686
						(118,136)
						(76,835)
\$557,592	\$179,614	\$ —	\$12,007	\$1,058,729	\$ (60,047)	\$1,462,602
911						
(8)	(1,577)		(2,057)	3,636		
1,548	59					
				16,054		(830)
(39,034)	(13,280)			65,562		(957)
					(94,252)	
					(3,507)	
					140	
						533,721
						(127,265)
						(69,570)
\$521,009	\$164,816	\$ —	\$ 9,950	\$1,143,981	\$ (157,666)	\$1,797,701
2,535						
(143)	(163,400)		(4,270)	167,796		
1,228	1					
	(1,417)			42,203		(1,820)
						(156)
					(36,624)	
					(6,889)	
					1,843	
						509,173
						(141,241)
						(66,824)
\$524,629	\$ —	\$ —	\$ 5,680	\$1,353,980	\$ (199,336)	\$2,096,833

Notes to Financial Statements

Note 1

Summary of Accounting Principles: The consolidated financial statements include the accounts of the Corporation and its domestic and international subsidiaries except for the unconsolidated finance and real estate subsidiaries which are accounted for under the equity method. International operating subsidiaries are included generally on the basis of fiscal years ending November 30.

Sales under government and commercial fixed-price contracts and government fixed-price-incentive contracts are recorded at the time deliveries are made. Sales under cost-reimbursement contracts are recorded as work is performed and billed. Sales under elevator and escalator installation and modernization contracts are accounted for under the percentage of completion method. Service contract revenues are recorded as sales when earned.

Inventories and contracts in progress are stated at the lower of cost or estimated realizable value. Inventories consist largely of raw materials and work in process. Materials in excess of requirements for contracts and orders currently in effect or anticipated have been eliminated. A considerable portion of the inventories is based on cost standards which are adjusted to reflect approximate current costs. The remainder of the inventories is stated either at average cost or at actual cost accumulated against specific contracts or orders or, in the case of a substantial portion of inventories in the building systems and industrial products businesses, at last-in, first-out (LIFO) cost. Manufacturing tooling costs are charged to inventories or to fixed assets depending upon their nature, general applicability and useful lives. Tooling costs included in inventory are charged to cost of sales based on usage, generally within two years after they enter productive use. All other manufacturing costs are allocated to current production; no such costs are deferred and assigned to future production.

Contracts in progress relate to elevator and escalator contracts and include standard cost of manufactured components, accumulated installation cost, and estimated earnings on uncompleted contracts.

Prospective losses, if any, on contracts are provided for when the losses become anticipated. Loss provisions are based upon any anticipated excess of inventoriable manufacturing or engineering cost over the selling price of the contract. Fleet introductory assistance allowances to commercial airline customers for new engine models and new engine applications are similarly charged off at the time firm orders are received from customers, if and to the extent that such allowances are in excess of expected gross margins of the products contemplated by the specific order.

Research and development costs not specifically covered by contracts are charged against income as incurred. General and administrative expenses also are charged against income as incurred. Costs pertaining to fulfillment of the Corporation's warranty and service policies and product guarantees are estimated on the basis of past experience and current product performance and, where believed to be significant and reasonably predictable in amount, are accrued at the time products are sold.

Current assets and current liabilities include items expected to be, or which may be, realized or liquidated during the next year.

Provisions for depreciation of plant and equipment related to the Corporation's aerospace operations have generally been made on accelerated methods. Provisions for depreciation of other plant and equipment have generally been made on the straight-line method. Wherever possible, accelerated methods are used for income tax purposes. Generally, estimated useful lives used for financial statement depreciation purposes range from 30 to 50 years for buildings and improvements, from 8 to 20 years for machinery and equipment, and from 5 to 10 years for office equipment. Improvements to leased property are amortized over the life of the lease.

Costs in excess of values assigned to the underlying net assets of acquired companies are included in deferred charges and are generally being amortized over 25 years.

Provisions for income taxes are based upon income and expenses recorded in accordance with the Corporation's regular accounting practices, and as shown in the financial statements. The income tax effects of differences in the time when income and expenses are reflected in accordance with such regular accounting practices and the time they are recognized for income tax purposes are shown in the balance sheet as deferred income taxes.

Investment tax credits are taken into income by reducing the provision for federal income taxes in the year the related assets are placed in service (the flow-through method). Prior to 1982, investment tax credits were deferred and amortized over the estimated useful lives of the related assets (the deferral method). See Note 2.

Earnings per share computations are based on the average number of shares of Common Stock outstanding during the year. Fully diluted earnings per share reflect the maximum dilution of per share earnings which would have occurred if all of the dilutive convertible securities of the Corporation had been converted on the dates of issue. Such earnings reflect the elimination of Convertible Subordinated Debenture interest, less applicable federal income taxes, and dividends on Convertible Preferred Stock.

Note 2

Accounting Change: Effective January 1, 1982, the Corporation changed its method of accounting for investment tax credits from the deferral method to the flow-through method in order to achieve greater comparability with the accounting practices of most other industrial concerns and, in the opinion of the Corporation, to more accurately reflect the economic impact of investment decisions on reported earnings. Under the flow-through method, the provision for federal income taxes is reduced by investment tax credits in the year the related assets are placed in service, rather than deferring such investment tax credits and amortizing them over the estimated useful lives of the related assets.

The effect of the change in 1982 was to increase net income by \$81,425,000 or \$1.53 per share on a primary basis and \$1.22 per share on a fully diluted basis, of which \$66,621,000 (\$1.25 primary earnings per share and \$1.00 fully diluted earnings per share) represents the cumulative effect of investment tax credits through 1981 and \$14,804,000 (\$.28 primary earnings per share and \$.22 fully diluted earnings per share) represents the net effect of 1982 investment tax credits. Pro forma earnings and related per share amounts as if the flow-through method had been adopted retroactively are included in the Consolidated Statement of Income.

Note 3

Supplementary Earnings Per Share: During 1983, 4,336,158 shares of Common Stock were issued upon conversion of 3,469,448 shares of \$3.875 Preferred Stock. Had the conversion of these securities, as well as conversions of these securities which occurred in 1982 and 1981, occurred on January 1, 1981, primary earnings per share would have been \$7.63 for 1983. For 1982, the primary earnings per share based on income before extraordinary item and cumulative effect of accounting change would have been \$6.45 and the primary earnings per share based on net income would have been \$8.31. The primary earnings per share for 1981 would have been \$7.33.

Note 4

Extraordinary Gain: In June 1982 the Corporation exchanged 1,919,311 shares of Common Stock valued at \$65,611,000 and cash of \$63,039,000, for \$133,400,000 principal amount of its outstanding 9% debentures due January 15, 2004, \$24,580,000 principal amount of 9% debentures due April 15, 2000, \$5,906,000 principal amount of 8% debentures due 1996 and \$1,150,000 principal amount of 7% debentures due 1998. The exchange resulted in an extraordinary gain, which is not subject to income taxes, of \$40,226,000 (\$.76 primary earnings per share and \$.60 fully diluted earnings per share) after deducting unamortized debt discount and other related expenses. The dilutive effect of the issuance of the shares of Common Stock was not material in amount.

Note 5

Interest Expense: During 1983 the Corporation and its consolidated subsidiaries incurred interest cost of \$243,224,000 (\$287,902,000 in 1982 and \$286,989,000 in 1981) and, pursuant to Financial Accounting Standard No. 34, "Capitalization of Interest Cost," capitalized \$34,651,000 (\$37,016,000 in 1982 and \$42,150,000 in 1981) of the total to be depreciated over the lives of the related fixed assets.

Note 6

International Operations: A substantial portion of the Corporation's revenues and assets relate to international operations. The Corporation has significant manufacturing facilities in Canada, France, Germany, Italy, Switzerland, the United Kingdom, Spain and Japan and operations of lesser size in a number of other countries. The investment (identifiable assets) in any single country other than the United States does not exceed 4% of the Corporation's total identifiable assets, except for investments in Canada which amounted to 6% of total identifiable assets at December 31, 1983. Amounts included in the accompanying consolidated financial statements associated with operations outside the United States consist of the following:

In Thousands of Dollars	1983	1982	1981
Sales	\$3,026,844	\$2,888,962	\$3,019,024
Net income	\$ 132,413	\$ 113,572	\$ 189,707
Assets	\$2,515,859	\$2,427,613	\$2,150,085
Liabilities	\$1,617,790	\$1,513,858	\$1,451,265
Minority interests	\$ 89,288	\$ 68,589	\$ 79,665

Pursuant to Financial Accounting Standard No. 52, which was adopted by the Corporation effective January 1, 1981, the financial position and results of operations of substantially all of the Corporation's significant foreign subsidiaries are measured using local currency as the functional currency. Assets and liabilities of such subsidiaries have been translated at current exchange rates, and related revenues and expenses have been translated at average-for-the-year exchange rates. The aggregate effect of translation adjustments (losses) so calculated, including the opening period adjustment in 1981, together with net gains from hedging exposed net asset positions less related tax effects, is being deferred as a separate component of Shareowners' Equity, until there is a sale or liquidation of the underlying foreign investments. At December 31, 1983, \$199,336,000 had been so deferred (\$157,666,000 at December 31, 1982 and \$60,047,000 at December 31, 1981) as a result of the strengthening during 1983, 1982 and 1981 of the U.S. dollar against most major foreign currencies, particularly the French franc, Spanish peseta, Canadian dollar, Dutch guilder, Italian lira, Swiss franc, Australian dollar and

Venezuelan bolivar. The Corporation has no present plans for sale or liquidation of significant investments to which these deferrals relate.

The economies of Brazil and, beginning in 1982, Mexico have been determined to be highly inflationary. Accordingly, under FAS No. 52, the U.S. dollar is deemed to be the functional currency of subsidiaries in those countries, and all translation gains and losses are taken into income.

After reflecting the adoption of FAS No. 52, earnings were charged with foreign exchange losses, including translation losses of operations in highly inflationary economies, of \$6,163,000, \$7,004,000 and \$12,145,000 in 1983, 1982 and 1981, respectively.

Note 7

Accounts Receivable: Allowances for doubtful accounts of \$64,687,000 and \$68,456,000 have been applied as a reduction of current accounts receivable at December 31, 1983 and 1982, respectively.

Current accounts receivable include amounts which represent retainage under contract provisions and amounts which are not presently billable because of lack of funding or final prices or contractual documents under government contracts or for other reasons. These items are not material in amount and are expected to be collected in the normal course of business.

Note 8

Inventories and Contracts in Progress: Inventories and contracts in progress at December 31, 1983 consisted of inventories of \$4,116,527,000 (\$4,160,543,000 at December 31, 1982) and elevator and escalator contracts in progress of \$790,700,000 (\$808,045,000 at December 31, 1982).

The principal elements of cost included in inventories are materials, purchased components, direct labor and manufacturing overhead (engineering overhead in the case of engineering contracts). Tooling and other costs are an insignificant portion of inventories.

A substantial portion of the Corporation's inventories in its building systems and industrial products businesses is valued under the LIFO method. If these inventories had been valued at the lower of replacement value or cost under the first-in, first-out method, they would have been higher by \$198,440,000 at December 31, 1983 (\$186,138,000 at December 31, 1982).

The book basis of LIFO inventories exceeded the tax basis of such inventories by approximately \$70,898,000 at December 31, 1983 (\$73,754,000 at December 31, 1982). In 1983 and 1982, income before income taxes on a LIFO book basis was approximately \$2,856,000 and \$3,150,000, respectively, less than that on a tax basis. These differences result from the assignment of fair value to inventories acquired in a business acquisition which has been accounted for as a purchase transaction.

The methods of accounting followed by the Corporation do not permit classification of inventories by categories of finished goods, work in process and raw materials. The Corporation's sales contracts in many cases are long-term contracts expected to be performed over periods exceeding twelve months.

Approximately 73 percent (76 percent at December 31, 1982) of total inventories and contracts in progress have been acquired

or manufactured under such long-term contracts. It is impracticable for the Corporation to determine the amounts of inventory scheduled for delivery under long-term contracts within the next twelve months.

Progress payments, secured by lien, on United States Government contracts, and billings on contracts in progress amounted to \$1,043,317,000 (\$1,197,963,000 at December 31, 1982) and \$871,265,000 (\$904,633,000 at December 31, 1982), respectively, at December 31, 1983.

Note 9

Unconsolidated Subsidiaries and Other Investments:

Investments consist of the following:

In Thousands of Dollars	1983	1982
Finance subsidiaries	\$225,723	\$199,586
Real estate subsidiary	24,117	25,477
Other companies	86,525	73,373
	\$336,365	\$298,436

Finance Subsidiaries:

The Corporation's investments in its finance subsidiaries — UT Credit Corporation (UT Credit), Carrier Distribution Credit Corporation (CDCC) and UT Communications Credit Corporation (UTCCC) — are carried at underlying equity, as shown in the finance subsidiaries' financial statements, and advances. The Corporation's equity in the net income of the finance subsidiaries attributable to external sources has been included in consolidated other income. The portion of the finance subsidiaries' income before taxes relating to inter-company financing and income maintenance fees has been eliminated in the consolidated financial statements.

The combined, condensed financial data set forth below have been summarized from the audited financial statements of UT Credit, CDCC, and UTCCC:

In Thousands of Dollars	1983	1982	1981
Income:			
Interest, lease and other	\$ 58,960	\$36,547	\$ 31,851
Intercompany interest and income maintenance fees	48,799	63,089	69,946
	\$107,759	\$99,636	\$101,797
Expenses:			
Interest	\$ 61,856	\$51,554	\$ 58,897
Depreciation	3,166	—	—
Administrative	3,276	3,549	5,732
Income taxes	12,664	18,689	17,586
	\$ 80,962	\$73,792	\$ 82,215
Cumulative effect of change in accounting principle	\$ —	\$ 3,543	\$ —
Net Income	\$ 26,797	\$29,387	\$ 19,582

In Thousands of Dollars	1983	1982
Assets:		
Cash and short-term cash investments	\$ 36,371	\$ 912
Accounts and notes receivable	664,243	616,663
Financing leases receivable, net of unearned income	93,239	78,853
Aircraft under operating leases (net of accumulated depreciation of \$3,166,000)	75,324	—
Other	27,776	23,458
	\$896,953	\$719,886
Liabilities and Shareholder's Equity:		
Commercial paper and other short-term borrowings	\$223,843	\$230,143
Accrued liabilities	27,921	17,474
Long-term debt of UT Credit:		
8% Notes due 1986	50,000	50,000
10% Subordinated Notes due 1993	50,000	—
11% Notes due 1993	100,000	—
8% Notes due 2002	68,460	75,000
8.85% Debentures due 2003	75,000	75,000
9% Subordinated Debentures due 2003	25,000	25,000
Intercompany loans	54,990	54,990
Long-term debt of CDCC:		
8% Senior Subordinated Notes due 1984-1992	9,000	10,000
Deferred income taxes	41,108	37,445
Capital stock	45,001	45,001
Retained earnings	126,630	99,833
	\$896,953	\$719,886

Scheduled maturities of the subsidiaries' long-term notes and leases receivable for the next five years are: \$38,083,000 in 1984; \$39,663,000 in 1985; \$43,073,000 in 1986; \$38,608,000 in 1987; and \$39,749,000 in 1988.

The finance subsidiaries are engaged in the business of financing the purchases of products of the Corporation and its subsidiaries and, in the case of UT Credit, products of other companies incorporating United Technologies' products. The subsidiaries provide financing through acquisition of accounts and notes receivable, leases and interests therein. Equipment financed for customers includes, principally, Pratt & Whitney Aircraft-powered commercial aircraft, Carrier products, Sikorsky helicopters and Building Systems communication equipment. UT Credit and CDCC also purchase, on a discounted basis from the Corporation, unsecured short-term receivables from airframe manufacturers and air-conditioning equipment distributors with maturities of up to six months. At December 31, 1983, the amount of such short-term receivables was approximately \$271,060,000, and the average investment in these receivables was \$274,102,000 in 1983.

In the first quarter of 1982, and effective January 1, 1982, the finance subsidiaries changed their method of accounting for investment tax credits from the deferral method to the flow-through method, consistent with the accounting change made by the Corporation. The effect of the change in 1982 was to increase net income by \$5,981,000, of which \$3,543,000 represented the cumulative effect of prior years' investment tax credits and \$2,438,000 represented the net effect of 1982 investment tax credits.

Operating agreements with UT Credit and CDCC provide that income maintenance payments will be made to the subsidiaries to the extent necessary so that the subsidiaries' earnings available for fixed charges shall not be less than one and one-half times such fixed charges. In addition, the Corporation is currently obligated by agreements to purchase receivables from UT Credit and CDCC in the event of default by the obligor and to purchase equipment held for lease under operating leases in the event that UT Credit is unable to lease such equipment on reasonable terms. At December 31, 1983, \$774,970,000 of the receivables and aircraft under operating leases included in the combined, condensed financial data of the finance subsidiaries were subject to such purchase terms.

As of December 31, 1983, the finance subsidiaries had outstanding commitments for financing of approximately \$425,000,000. The commitments mainly relate to aircraft engine financing, of which \$225,000,000 is subject to future aircraft orders to be placed by the customers. Of the total amount, \$125,000,000 may be required to be disbursed in 1984, \$75,000,000 in 1985 and \$225,000,000 in 1986 and later years.

During the fourth quarter of 1982, UT Credit filed a Registration Statement with the Securities and Exchange Commission covering \$300 million of long-term debt securities to be issued at such times as market conditions are considered favorable. UT Credit issued in January 1983, \$100 million of 10 year notes at an interest rate of 11% and in April 1983, \$50 million of subordinated 10 year notes at an interest rate of 10% under such Registration Statement. The proceeds were used principally to reduce short-term borrowings. The proceeds of the remaining \$150 million, if issued, will be used principally to reduce short-term borrowings and/or to meet financing commitments discussed above.

Real Estate Subsidiary:

In 1982, the Corporation formed an unconsolidated real estate subsidiary, which in December 1982 purchased an office building in Hartford, Connecticut. Approximately 20% of the office building is utilized as the headquarters of the Corporation. The subsidiary's principal asset is the office building,

at a cost of \$51 million. Its liabilities consist principally of an 8% mortgage of \$26 million payable in installments to 1999 (which is without recourse to the Corporation), and a non-interest-bearing intercompany account payable to the Corporation of \$24 million. The real estate subsidiary holds a 99 year lease on the land underlying the building, at an initial rental of \$1 million per year, which is adjustable annually based on certain factors and within certain limitations. The subsidiary also has certain rights and obligations (which are guaranteed by the Corporation) concerning future purchase of the land.

The results of operations were not significant in the real estate subsidiary in 1983 and 1982.

Note 10

Deferred Charges: Included in deferred charges are costs in excess of the net assets of acquired companies (goodwill), net of amortization as follows:

In Thousands of Dollars	1983	1982
Goodwill	\$647,808	\$627,593
Accumulated amortization	(112,404)	(95,165)
	\$535,404	\$532,428

During 1983 and 1982, net additions of \$20,215,000 and net reductions of \$7,432,000, respectively, were recorded, representing business acquisitions and dispositions and net adjustments on completion of accounting studies to assign values to the net assets of acquired companies.

Note 11

Short-Term Borrowings and Lines of Credit: The following summarizes the short-term borrowings of the Corporation and its consolidated subsidiaries as of December 31, 1983 and 1982:

In Thousands of Dollars	1983	1982
Bank borrowings	\$249,244	\$217,371
Commercial paper	148,905	232,020
	\$398,149	\$449,391

At December 31, 1983, the Corporation had credit commitments by banks totaling \$2,000,000,000. These comprised \$1,000,000,000 of formal lines of credit (available on an either/or basis to the Corporation and UT Credit, and up to \$500,000,000 is available to CDCC on an informal basis) and \$1,000,000,000 under a Revolving Credit Agreement (available on an either/or basis to the Corporation and UT Credit). The bank lines provide for short-term borrowings, at interest rates up to prime rates and for a fee of ¼% per year, through February 29, 1984 and extension of the lines beyond that date is presently under negotiation. The Revolving Credit Agreement provides for borrowings through September 30, 1990, at interest rates up to ½% over the prime rate and for a commitment fee of up to ½% per year on undrawn amounts. At the end of 1983, the major portion of the bank borrowings shown in the table above were borrowings by non-U.S. subsidiaries, and none were under the formal bank lines. The only borrowings under such lines were by UT Credit, in the amount of \$2,700,000. There were no borrowings under the Revolving Credit Agreement. The unused bank lines and the Revolving Credit Agreement serve as informal backup facilities for commercial paper.

Under informal arrangements, the Corporation maintains compensating balances with banks which, although they fluctuate from time to time, generally range from \$40 to \$45 million.

Note 12

Taxes on Income: The provision for income taxes for each of the three years ended December 31, 1983 comprised the following:

In Thousands of Dollars	1983	1982	1981
Currently payable:			
United States			
Federal	\$127,817	\$ 78,344	\$149,891
State	30,183	50,740	30,457
Foreign	125,711	142,505	146,743
	\$283,711	\$271,589	\$327,091
Deferred:			
United States			
Federal	\$ 38,421	\$ 59,025	\$ 38,697
State	8,324	(6,941)	16,274
Foreign	4,648	(5,429)	3,867
	\$ 51,393	\$ 46,655	\$ 58,838
Investment tax credit deferred, net	\$ —	\$ —	\$ 16,762
	\$335,104	\$318,244	\$402,691

As discussed in Note 2, the Corporation adopted the flow-through method of accounting for investment tax credits effective January 1, 1982. The current tax provisions for 1983 and 1982 have been reduced by \$23,065,000 and \$27,044,000, respectively, for the effect of investment tax credits generated in 1983 and 1982.

Deferred income taxes represent the tax effects of transactions which are reported in different periods for financial and tax reporting purposes. Changes in deferred federal income taxes shown above include the income tax effects of:

In Thousands of Dollars	1983	1982	1981
Use of completed-contract method for reporting taxable income on long-term manufacturing contracts	\$ (8,528)	\$18,903	\$(17,792)
Tax depreciation in excess of financial statement depreciation	29,404	23,580	18,286
Capitalization of interest cost, less related depreciation	9,443	14,873	17,286
Adjustments of assets and liabilities for tax purposes, which tend to recur annually:			
Adjustment of inventories to tax basis	(3,944)	(6,365)	221
Expenditures (provisions) for warranty and correction of product deficiencies, tax deductible when paid	(5,382)	2,747	6,818
Insurance and employee benefits deductible on different bases for book and tax purposes	(10,759)	1,167	(2,948)
Customer allowances, tax deductible when paid or applied	38,293	974	25,663
Other items	(10,106)	3,146	(8,837)
	\$ 38,421	\$59,025	\$ 38,697

The sources of income before income taxes for each of the three years ended December 31, 1983 were:

In Thousands of Dollars	1983	1982	1981
United States	\$600,284	\$502,981	\$535,374
Foreign	258,957	254,743	340,041
	\$859,241	\$757,724	\$875,415

Deferred income taxes generally have not been provided on undistributed earnings of international subsidiaries and of the Corporation's export subsidiaries which are Domestic International Sales Corporations (DISCs), amounting to \$614,605,000, included in consolidated retained earnings at December 31, 1983. A substantial portion of the undistributed earnings of the international subsidiaries has been reinvested and the Corporation believes that income taxes otherwise payable upon repatriation of earnings not reinvested would be largely offset by available foreign tax credits. In the case of DISCs, the Corporation has reduced its income tax provisions to the extent that management believes that export earnings can continue to be reinvested in export-related assets and the taxes postponed, as provided by this legislation.

Differences between effective income tax rates and the statutory U.S. federal income tax rates are as follows:

	1983	1982	1981
Statutory U.S. federal income tax rates	46.0%	46.0%	46.0%
State and local income taxes, net of federal tax benefit	2.4	3.1	2.9
Research and experimentation credit	(3.8)	(2.0)	(0.6)
Investment tax credit	(2.7)	(3.6)	—
Amortization of investment tax credit	—	—	(1.8)
Varying tax rates of consolidated subsidiaries (including DISC)	(3.8)	(4.2)	(3.1)
Foreign currency balance sheet translation adjustments, without tax effect	0.2	0.7	0.5
Amortization of excess purchase cost and other purchase accounting adjustments, without tax effect	2.0	2.5	2.1
Equity in earnings of unconsolidated subsidiaries	(1.0)	(1.1)	(0.5)
Other	(0.3)	0.6	0.5
Effective income tax rates	39.0%	42.0%	46.0%

Note 13*Long-Term Debt:* Long-term debt consists of the following:

In Thousands of Dollars	1983	1982
11.10% Notes due January 10, 1984-1985	\$ 66,700	\$100,000
9% Notes due April 15, 1985	100,000	100,000
9.45% Notes due January 15, 1989	100,000	100,000
9% Sinking Fund Debentures due April 15, 2000	75,420	75,420
9% Sinking Fund Debentures due January 15, 2004	66,600	66,600
11¼% Sinking Fund Debentures due November 15, 2012	100,000	100,000
Carrier 7¼% Debentures due 1998	36,996	39,991
United Technologies Finance (Netherlands Antilles) NV:		
6½% Swiss Franc Notes due September 28, 1987	34,404	37,407
12% Guaranteed Notes due October 15, 1989	100,000	100,000
7% Deutsche Mark Bearer Bonds due 1992	36,758	41,990
Other, average interest rate 8.9%, due 1984 to 2009	212,255	220,925
	\$929,133	\$982,333
Less — current portion	60,165	55,153
	\$868,968	\$927,180

In 1982 the Corporation filed a Registration Statement with the Securities and Exchange Commission covering up to \$300,000,000 of long-term debt securities, to be issued at such times as market conditions are considered favorable. In November 1982, the Corporation issued \$100,000,000 of 11¼% Sinking Fund Debentures due November 15, 2012 pursuant to that Registration Statement. It is intended that proceeds from the remaining \$200,000,000 of debt, if and when issued, will be used for general corporate purposes, including the reduction of short-term borrowings, if applicable.

Required payments on long-term debt for the next five years are \$60,165,000 in 1984, \$162,129,000 in 1985, \$30,225,000 in 1986, \$70,604,000 in 1987, and \$17,437,000 in 1988.

Note 14*Shareowners' Equity:* Preferred Stock consists of the following:

In Thousands of Dollars	1983	1982
\$4.50 Cumulative Dividend Preferred Stock (Outstanding — 19,694 and 19,994 shares, respectively) (Liquidating preference — \$105 per share, aggregating \$2,068,000)	\$ 1,969	\$ 1,999
\$2.55 Cumulative Dividend Convertible Preferred Stock (Outstanding — 20,847,934 and 20,695,238 shares, respectively) (Liquidating preference — \$25 per share, aggregating \$521,198,000)	524,629	521,009
\$3.875 Cumulative Dividend Convertible Preferred Stock	—	164,816
\$8.00 Cumulative Dividend Convertible Preferred Stock (Outstanding — 65,915 and 115,477 shares, respectively) (Liquidating preference — \$100 per share, aggregating \$6,592,000)	5,680	9,950
	\$532,278	\$697,774

The \$4.50 Preferred Stock is redeemable at the option of the Corporation at \$105.00 per share plus accrued and unpaid dividends. The \$2.55 Convertible Preferred Stock will be redeemable at the option of the Corporation on and after September 1, 1986, initially at \$29.00 per share, and thereafter at decreasing amounts to \$25.00 per share on September 1, 1994, plus accrued and unpaid dividends. Each share is convertible at the option of the holder at any time into .3928 share of Common Stock, plus accrued and unpaid dividends. The \$8.00 Preferred Stock will be redeemable at the option of the Corporation on and after April 1, 1984 at \$100.00 per share plus accrued and unpaid dividends. Each share is convertible at the option of the holder at any time into 4.44 shares of Common Stock.

In November 1983 a redemption notice was given to holders of the \$3.875 Convertible Preferred Stock at \$52.50 per share. Substantially all outstanding shares were converted into Common Stock prior to the redemption date. In December 1983 the Corporation announced its intention to call for redemption the \$8.00 Convertible Preferred Stock on April 2, 1984.

In January 1982, the Corporation announced plans to reacquire, for cash, up to \$100,000,000 of its Convertible Preferred Stock. The Corporation reacquired 282,000 shares of the \$3.875 Preferred Stock and 1,825,100 shares of the \$2.55 Preferred Stock during 1982 for a total purchase of \$53,271,000. The shares of Preferred Stock reacquired would have been convertible into 1,058,956 shares of Common Stock, at the dates of purchase.

At December 31, 1983, 33,235 and 9,466,660 shares of Preferred Stock and Common Stock, respectively, were reserved for issuance under various employee incentive plans (Note 15). In addition, 91,438 shares of Preferred Stock were reserved for issuance on conversion of certain debentures of Carrier Corporation.

The terms of the indentures relating to certain issues of long-term debt include provisions intended to restrict, under certain conditions, the availability of retained earnings for payment of dividends on the Common Stock. At December 31, 1983, all of the Corporation's retained earnings were free of such restrictions.

At December 31, 1983, undistributed earnings of \$114,682,000 of the Corporation's unconsolidated finance subsidiaries were included in retained earnings.

Note 15

Employee Benefit Plans: The Corporation's general policy is to fund current pension costs as accrued. Pension costs were \$215,516,000 in 1983, \$200,106,000 in 1982 and \$199,892,000 in 1981. These amounts included amortization of prior service costs over periods ranging from 14 years for the principal plans to 30 years for certain of the subsidiaries' plans. Changes in 1982 in the actuarial assumptions used to determine pension costs for several plans, together with increases in plan benefits, had the net effect of reducing pension costs by approximately \$25,726,000. A comparison of accumulated plan benefits and plan net assets for the defined benefit plans of the Corporation and its subsidiaries, generally as of January 1, is shown below:

In Thousands of Dollars	1983	1982
Actuarial present value of accumulated plan benefits:		
Vested	\$2,193,057	\$1,972,099
Nonvested	158,877	139,499
	\$2,351,934	\$2,111,598
Net assets available for benefits	\$3,255,195	\$2,855,849

The assumed rates of return used in determining the actuarial present value of accumulated plan benefits, generally the rates published by the Pension Benefit Guaranty Corporation as of the dates of valuation, were 7.85% and 7.75%, on a weighted average basis, for 1983 and 1982, respectively. Pension plans of the Corporation's international subsidiaries generally do not determine the actuarial value of accumulated benefits and the value of net assets on the basis shown above. For these plans, unfunded vested benefits as of December 31, 1983 and 1982 were \$20,137,000 and \$19,772,000, respectively. Liabilities under unfunded pension plans of certain international subsidiaries and for employee severance benefits, including those accruing to employees under foreign government regulations, are included in other long-term liabilities in the accompanying balance sheet.

At December 31, 1983, 4,009,806 shares of Common Stock were reserved for issuance under the Corporation's 1974 and 1976 Stock Option Plans and 1979 Long Term Incentive Plan. Option prices under these Plans approximate 100% of the market price of the Common Stock on the dates the options are issued. Effective February 5, 1982, the Board of Directors, upon shareowners' approval, authorized the cancellation of outstanding options for 1,922,633 shares of Common Stock granted under the 1976 Stock Option Plan and the 1979 Long Term Incentive Plan in 1980 and 1981 at option prices averaging \$51.57, and their reissue at a price of \$35.875, which represented fair market value as of that date. The 1979 Plan provides for the granting of Stock Appreciation Rights linked with stock options granted under either the 1979 Plan or the 1976 Plan. The exercise of either a Stock Appreciation Right or a stock option automatically cancels the connected option or right.

The 1979 Plan also provides for the granting of Performance Units. The units are payable at the end of each award period, which may not exceed 5 years, and then only if certain minimum Corporate earnings targets are met. In certain instances, the exercise of either a stock option or a Performance Unit automatically cancels the related unit or option.

A summary of the transactions under all Plans for the three years ended December 31, 1983 is set forth on the following page.

	Stock Options		Stock Appreciation Rights		Performance Units
	Shares	Average Price	Rights	Average Price	Units
Outstanding — December 31, 1980	3,357,369	\$39.73	283,591	\$42.55	718,839
Granted	1,163,018	\$53.54	115,502	\$50.36	458,660
Exercised	(498,268)	\$34.40	(45,500)	\$40.77	—
Cancelled	(366,141)	\$44.30	(104,660)	\$42.66	(82,838)
Outstanding — December 31, 1981	3,655,978	\$44.39	248,933	\$46.46	1,094,661
Granted	1,294,677	\$35.94	219,568	\$35.88	472,634
Exercised	(422,135)	\$33.84	(40,588)	\$37.62	(220,614)
Cancelled	(2,259,423)	\$49.16	(22,783)	\$46.55	(62,829)
Reissued	1,798,665	\$35.88	—	—	—
Outstanding — December 31, 1982	4,067,762	\$36.37	405,130	\$41.60	1,283,852
Granted	1,260,144	\$61.81	338,439	\$59.13	507,596
Exercised	(1,042,706)	\$35.74	(149,333)	\$41.16	(166,662)
Cancelled	(275,394)	\$43.90	(53,875)	\$46.48	(308,880)
Outstanding — December 31, 1983	4,009,806	\$44.02	540,361	\$52.22	1,315,906

At December 31, 1983, stock options for 716,000 shares of Common Stock were exercisable at an average price of \$34.92 per share. The number of options available for grant under all of the Plans at December 31, 1983 was 5,376,704 (1,278,985 at December 31, 1982).

There were also outstanding options at December 31, 1983 under prior Carrier plans for 33,235 shares of \$2.55 Preferred Stock at an average price of \$17.31. All of these shares were exercisable. During the year options for 75,342 shares were exercised at an average price of \$17.36 and options for 1,103 shares were cancelled at an average price of \$18.07.

In addition, there were outstanding options for \$3.875 Preferred Stock under prior plans of another acquired company. During the year options for 50 shares of such stock at an average price of \$24.05 were exercised and 500 shares at an average price of \$24.05 were cancelled. On December 15, 1983 options for 3,075 shares of \$3.875 Preferred Stock were converted into options for 3,843 shares of Common Stock. Subsequent to such conversion, options for 631 shares of Common Stock were exercised at an average price of \$11.44. At December 31, 1983 there were outstanding options for 3,212 shares of Common Stock at an average price of \$11.67 under such plans.

For 1983, \$35,205,000 (\$44,197,000 in 1982 and \$47,016,000 in 1981) was charged to income with respect to employee incentive plans of the Corporation and certain of its subsidiaries, of which \$31,833,000 (\$30,358,000 in 1982 and \$27,912,000 in 1981) was authorized for distribution among officers and employees by the Board of Directors under the Corporation's principal Incentive Compensation Plan, and the remainder was accrued under the 1979 Long-Term Incentive Plan and plans of acquired companies.

The Corporation and a number of its subsidiaries have savings plans in which a portion of employee contributions is matched by the employer. The matching contributions totaled \$46,964,000 in 1983 (\$39,024,000 in 1982 and \$33,943,000 in 1981).

Note 16

Commitments and Contingent Liabilities: The Corporation is engaged in various legal proceedings and, at December 31, 1983, was contingently liable in the amount of approximately \$40,000,000 representing discounted accounts and notes receivable and participations in guarantees of aircraft financing arrangements. Management does not expect that amounts, if any, which may be required to be paid by reason of such litigation, discounted receivables or guarantees will be of material importance to the financial condition or earnings of the Corporation.

The Corporation extends performance and operating cost guarantees, which are beyond its normal warranty and service policies, for extended periods on some of its products,

particularly commercial aircraft engines. Liability under such guarantees is contingent upon future product performance and durability. Management has no present reason to believe that such guarantees will result in material losses to the Corporation.

At December 31, 1983 the Corporation had commitments of \$221,396,000 on purchase orders issued for acquisition of fixed assets.

The Corporation and its subsidiaries occupy space and use certain equipment under lease arrangements. The Corporation is not a lessee under any capital leases of significance. Rent expense in 1983, 1982 and 1981 under such arrangements totaled \$227,536,000, \$202,530,000 and \$177,799,000, respectively. Rental commitments at December 31, 1983 under long-term noncancellable operating leases were as follows:

In Thousands of Dollars	Land, Buildings and Office Space	Machinery, Tools and Equipment
1984	\$ 79,350	\$ 87,106
1985	72,920	65,304
1986	64,337	50,644
1987	57,049	21,943
1988	53,809	11,195
After 1988	455,992	13,289
	783,457	249,481
Less:		
Sublease rentals	(79,369)	(41)
	\$704,088	\$249,440

Note 17

Business Segment Financial Data: Business segment information for the three years ended December 31, 1983, required by Financial Accounting Standard No. 14, appears in the Consolidated Summary of Business Segment Financial Data on pages 39 through 41.

Note 18

Changing Prices (Unaudited): The inflation data presented below for 1983 and 1982 has been provided in accordance with Financial Accounting Standard No. 33, "Financial Reporting and Changing Prices," as amended by FAS No. 70, "Financial Reporting and Changing Prices: Foreign Currency Translation." The inflation data for 1981 also has been restated in accordance with the latter Standard. The inflation data for 1980 and 1979 has been provided as required by FAS No. 33.

The following table summarizes adjustments to net income for 1983 required to be presented by FAS No. 33 as amended:

Net Income, Adjusted for Changing Prices

In Thousands of Dollars

Net Income	\$ 509,000
Adjustments for changes in specific prices:	
Cost of goods and services sold, excluding depreciation	(18,000)
Depreciation	(45,000)
Adjusted for current cost	\$ 446,000
Gain from decline in purchasing power of net amounts owed	\$ 15,000
Foreign currency translation adjustment	\$ (78,000)
Increase in current cost of inventories and fixed assets held during the year*	\$ 138,000
Increase in general price level	188,000
Excess of increase in general prices over increase in specific prices	\$ 50,000

*At December 31, 1983, the current cost of inventories and net fixed assets was \$5,108 million and \$3,545 million, respectively.

The inflation adjustments to cost of goods and services sold and depreciation expense, and to net assets at year end as shown on page 38, have been derived by restating historical costs in terms of current costs. Under current costs, historical costs are restated to costs which are current at the balance sheet date or date of sale or use, generally by reference to current manufacturing costs and by application of specific price indices to historical costs. Current cost data is measured after foreign currency translation and based on the U.S. CPI(U) (the translate-restate method).

Certain fixed assets of the Corporation have been depreciated in the historical financial statements under accelerated methods, partially to allow for expected cost increases. To provide the most meaningful basis of adjustments, current cost depreciation has been determined on the straight-line method. Estimates of asset life and related salvage value are consistent with those used in the historical financial statements.

Because a major portion of the Corporation's business is conducted under long-term contracts with customers, selling prices established for product deliveries in future periods have generally reflected estimated costs to be incurred in those future periods. Accordingly, the principal portion of inventories and contracts in progress and cost of goods and services sold included in the Corporation's historical financial statements relating to items which were manufactured or acquired for sale under long-term contract arrangements have not been restated for the effects of changing prices.

As prescribed by FAS No. 33, no adjustments or allocations of the amount of historical income taxes have been made in determining net income adjusted for the effects of changing prices. Because corporate profits are taxed, under the U.S. Internal Revenue Code and in most other countries, on the basis of historical cost results without regard to the inflated cost of replacing corporate assets, the effective income tax

rate is higher on a current cost basis than on a historical cost basis. The result of current tax policies in an inflationary economy is to reduce the funds which would otherwise be available to businesses for replacing, modernizing and expanding capital facilities.

The following five-year summary reflects the adjustments to the 1983 data described above and similar adjustments for 1982, 1981, 1980 and 1979.

Five-Year Summary of Selected Financial Data Adjusted for the Effect of Changing Prices (Unaudited)

	1983	1982	1981	1980	1979 Pro Forma +	1979
In Thousands of Dollars (except per share amounts)						
Sales*	\$14,669,000	\$13,984,000	\$14,946,000	\$14,874,000	\$14,527,000	\$12,405,000
Current Cost Data:						
Income before extraordinary item and cumulative effect of accounting change	\$ 446,000	\$ 313,000	\$ 374,000	\$ 334,000	\$ 323,000	\$ 314,000
Per Share of Common Stock:						
Primary earnings	\$6.81	\$4.54	\$5.86	\$5.50	\$5.03	\$5.73
Fully diluted earnings	\$6.55	\$4.42	\$5.53	\$5.13	\$4.79	\$5.26
Net Assets at Year End	\$ 4,841,000	\$ 4,542,000	\$ 4,670,000	\$ 4,464,000		\$ 4,582,000
Increase in Current Costs greater than (less than) increase in General Prices	\$ (50,000)	\$ 13,000	\$ (50,000)	\$ (210,000)		\$ (110,000)
Gain from Decline in Purchasing Power of Net Amounts Owed	\$ 15,000	\$ 18,000	\$ 49,000	\$ 52,000		\$ 19,000
Foreign Currency Translation Adjustment	\$ (78,000)	\$ (139,000)	\$ (77,000)	—		—
Cash Dividends per Common Share*	\$2.55	\$2.47	\$2.63	\$2.66		\$3.02
Market Price per Common Share at Year End*	72½	58¾	45¾	73¾		58¾
Average U.S. Consumer Price Index	298.5**	289.1	272.4	246.8		217.4

* As reported for 1983. Except for the 1983 current cost data, all other data in this table have been restated in terms of average 1983 dollars based on general price indices.

** Estimated

+ Pro forma as if Carrier and Mostek had been wholly-owned subsidiaries on January 1, 1979.

The foregoing supplementary information, prepared in accordance with FAS No. 33, as amended by FAS No. 70 for 1983, 1982 and 1981, is viewed as experimental by the Financial Accounting Standards Board. It involves the use of assumptions and estimates and, therefore, should be viewed in that context and not necessarily as a reliable indicator of the effect of inflation on the Corporation's results of operations or its financial position.

Consolidated Summary of Business Segment Financial Data

United Technologies Corporation

Industry Segments

Years Ended December 31,

In Thousands of Dollars

	1983	1982	1981
Revenues			
Power	\$ 5,146,127	\$ 5,271,606	\$ 5,566,682
Flight Systems	2,321,859	1,996,776	1,656,749
Building Systems	3,950,417	3,683,830	3,741,626
Industrial Products for the Automotive, Electronics and Other Industries	3,156,152	2,524,942	2,587,562
Other	344,689	307,759	291,679
Eliminations	(249,979)	(207,784)	(176,540)
Consolidated revenue	<u>\$14,669,265</u>	<u>\$13,577,129</u>	<u>\$13,667,758</u>
Operating Profit			
Power	\$ 301,352	\$ 420,351	\$ 596,437
Flight Systems	198,231	169,256	105,465
Building Systems	271,994	257,114	285,230
Industrial Products for the Automotive, Electronics and Other Industries	159,612	34,450	34,463
Other	663	7,465	12,074
Eliminations	3,645	(3,759)	2,915
Operating profit	<u>935,497</u>	<u>884,877</u>	<u>1,036,584</u>
Other income, less other deductions	151,487	139,000	96,839
Interest expense	(208,573)	(250,886)	(244,839)
General corporate expenses	(19,170)	(15,267)	(13,169)
Consolidated income before income taxes	<u>\$ 859,241</u>	<u>\$ 757,724</u>	<u>\$ 875,415</u>
Identifiable Assets			
Power	\$ 2,829,265	\$ 2,700,740	\$ 2,759,899
Flight Systems	1,116,265	953,971	822,781
Building Systems	1,867,680	1,787,050	1,626,007
Industrial Products for the Automotive, Electronics and Other Industries	2,255,399	2,032,147	1,956,802
General corporate assets, and other	651,450	519,468	389,614
Consolidated assets	<u>\$ 8,720,059</u>	<u>\$ 7,993,376</u>	<u>\$ 7,555,103</u>
Capital Expenditures			
Power	\$ 237,070	\$ 189,734	\$ 245,854
Flight Systems	110,160	69,994	49,031
Building Systems	112,900	89,581	96,102
Industrial Products for the Automotive, Electronics and Other Industries	180,827	156,007	176,027
General corporate assets, and other	33,861	23,037	24,178
Consolidated additions to fixed assets	<u>\$ 674,818</u>	<u>\$ 528,353</u>	<u>\$ 591,192</u>

Consolidated Summary of Business Segment Financial Data continued

United Technologies Corporation

Geographic Areas

In Thousands of Dollars

Years Ended December 31,

	1983	1982	1981
Revenues			
United States operations	\$12,035,472	\$11,007,974	\$10,975,653
International operations:			
Europe	1,590,913	1,437,496	1,379,298
Other	1,465,398	1,487,633	1,676,105
Eliminations	(422,518)	(355,974)	(363,298)
Consolidated revenue	<u>\$14,669,265</u>	<u>\$13,577,129</u>	<u>\$13,667,758</u>
Operating Profit			
United States operations	\$ 665,454	\$ 605,365	\$ 669,064
International operations:			
Europe	112,258	123,118	116,194
Other	152,477	155,353	247,265
Eliminations	5,308	1,041	4,061
Operating profit	935,497	884,877	1,036,584
Other income, less other deductions	151,487	139,000	96,839
Interest expense	(208,573)	(250,886)	(244,839)
General corporate expenses	(19,170)	(15,267)	(13,169)
Consolidated income before income taxes	<u>\$ 859,241</u>	<u>\$ 757,724</u>	<u>\$ 875,415</u>
Identifiable Assets			
United States operations	\$ 6,163,414	\$ 5,641,215	\$ 5,371,182
International operations:			
Europe	1,185,499	1,049,721	954,198
Other	1,194,040	1,154,153	1,080,566
General corporate assets, and other	177,106	148,287	149,157
Consolidated assets	<u>\$ 8,720,059</u>	<u>\$ 7,993,376</u>	<u>\$ 7,555,103</u>

See accompanying Notes to Consolidated Summary of Business Segment Financial Data

Notes to Consolidated
Summary of Business Segment
Financial Data

(A) The Corporation and its consolidated subsidiaries design, develop, manufacture and sell high-technology products, classified in four principal industry segments or lines of business in accordance with Financial Accounting Standard No. 14.

Power products are principally aircraft engines and substantial spare parts. Energy process equipment and modified aircraft engines and related equipment for electrical power generation and other applications are also included.

Flight Systems products include helicopters, propellers, rocket motors, and fuel control, environmental, radar, cockpit and integrated display and other airborne and space systems.

Building Systems products include air-conditioning equipment, elevators and escalators, substantial service, maintenance and spare parts, advanced communications systems and integrated building systems and services.

Industrial Products for the Automotive, Electronics and Other Industries include electrical wiring systems, electro-mechanical and hydraulic devices, paint, fuel injection systems, electric motors, and other products for the automotive industry; controls and control systems for the appliance and related industries; magnet wire and winding machinery for the electric motor, transformer and electromagnetic equipment industries; semiconductor devices for the electronics industry; ink and other chemical specialty products for the printing and other industries; and a variety of wire and cable products.

Activities classified as "Other" consist of a variety of business activities, including the design and manufacture of naval radar, military command and control and computer systems, and radioactivity measurement and gas chromatography instruments.

(B) Revenue by industry segment, and geographic area, includes intersegment sales and transfers between geographic areas. Generally, such sales and transfers are made at prices approximating those which the selling or transferring entity is able to obtain on sales of similar products to unaffiliated customers. Certain domestic transfers are, however, made at inventory cost. These are principally transfers of wire products within the Industrial Products classification.

Revenues include sales under prime contracts and subcontracts to the U.S. Government, for the most part Power and Flight Systems products, as follows:

In Thousands of Dollars	1983	1982	1981
Power	\$2,722,816	\$2,786,509	\$2,542,238
Flight Systems	\$1,832,646	\$1,544,240	\$1,122,658

Revenues from United States operations include export sales of \$2,383,411,000 in 1983, \$2,271,721,000 in 1982 and \$2,636,437,000 in 1981. Export sales to Europe were \$491,000,000, \$539,306,000 and \$706,060,000 of the 1983, 1982 and 1981 amounts, respectively. Export sales include direct sales to commercial customers outside the United States and sales to the U.S. Government, commercial and affiliated customers which are known to be for resale to customers outside the United States.

(C) Operating profit is total revenue less operating expenses. In determining operating profit, none of the following has been included or deducted: other income, less other deductions; general corporate expenses; interest expense; and income taxes.

(D) Identifiable assets are those which are specifically identified with the industry segments and geographic areas in which operations are conducted. General corporate assets consist principally of cash and short-term cash investments, and investments in unconsolidated finance subsidiaries and other companies.

Depreciation charges are as follows:

In Thousands of Dollars	1983	1982	1981
Power	\$146,680	\$130,716	\$105,829
Flight Systems	\$ 44,296	\$ 38,165	\$ 31,659
Building Systems	\$ 63,152	\$ 55,399	\$ 55,076
Industrial Products	\$102,245	\$ 87,964	\$ 72,790

(E) Eliminations made in reconciling industry and geographic area data with the related consolidated amounts include intersegment sales and transfers between geographic areas, unrealized profits in inventory and similar items.

(F) The Summary of Business Segment Financial Data should be read in conjunction with the other financial statements of the Corporation and notes thereto appearing elsewhere in this Annual Report.

Selected Quarterly Financial Data

United Technologies Corporation

In Thousands of Dollars (except per share amounts)	Quarter Ended				
	March 31	June 30	September 30	December 31	For the Year
1983					
Sales	\$3,535,407	\$3,714,109	\$3,527,247	\$3,892,502	\$14,669,265
Gross Profit	\$ 902,131	\$ 983,322	\$ 948,287	\$1,067,251	\$ 3,900,991
Net Income	\$ 110,075	\$ 140,003	\$ 121,021	\$ 138,074	\$ 509,173
Preferred Stock Dividend Requirement	\$ 16,830	\$ 16,813	\$ 16,635	\$ 16,546	\$ 66,824
Earnings Applicable to Common Stock	\$ 93,245	\$ 123,190	\$ 104,386	\$ 121,528	\$ 442,349
Earnings Per Share:					
Primary	\$1.71	\$2.23	\$1.88	\$2.12	\$7.94
Fully Diluted	\$1.63	\$2.05	\$1.77	\$2.03	\$7.48
1982					
Sales	\$3,214,052	\$3,513,636	\$3,306,486	\$3,542,955	\$13,577,129
Gross Profit	\$ 868,883	\$ 929,562	\$ 883,283	\$ 939,250	\$ 3,620,978
Income Before Extraordinary Item and Cumulative Effect of Change in Accounting Principle	\$ 95,518	\$ 105,330	\$ 113,195	\$ 112,831	\$ 426,874
Net Income	\$ 162,139	\$ 145,556	\$ 113,195	\$ 112,831	\$ 533,721
Preferred Stock Dividend Requirement	\$ 18,278	\$ 17,594	\$ 16,854	\$ 16,844	\$ 69,570
Earnings Applicable to Common Stock	\$ 143,861	\$ 127,962	\$ 96,341	\$ 95,987	\$ 464,151
Per Share of Common Stock:					
Income Before Extraordinary Item and Cumulative Effect of Change in Accounting Principle:					
Primary	\$1.49	\$1.68	\$1.78	\$1.78	\$6.73
Fully Diluted	\$1.45	\$1.60	\$1.68	\$1.68	\$6.47
Net Income:					
Primary*	\$2.77	\$2.45	\$1.78	\$1.78	\$8.74
Fully Diluted*	\$2.46	\$2.21	\$1.68	\$1.68	\$8.01

Notes: Effective January 1, 1982, the Corporation changed its method of accounting for investment tax credits from the deferral method to the flow-through method as more fully described in Note 2 of Notes to Financial Statements. The cumulative effect of \$66.6 million representing the unamortized portion of prior years' investment tax credit has been included in the quarter ended March 31, 1982.

The quarter ended June 30, 1982 includes an extraordinary gain of \$40.2 million resulting from the exchange of cash and 1,919,311 shares of Common Stock of the Corporation for \$165 million principal amount of debentures. See Note 4 of Notes to Financial Statements.

*In 1982, average common shares outstanding for the year were greater than such shares in the first and second quarters, when the cumulative effect of the accounting change and the extraordinary gain were reported. As a result, earnings per share in 1982, for the individual quarters, do not equal the per share amounts for the year.

Directors

Board of Directors

Stillman B. Brown
Executive Vice President — Finance and Administration

Robert J. Carlson
President

Antonia Handler Chayes
Partner, Csaplar and Bok (Law Firm)

Robert F. Dee
Chairman of the Board, SmithKline Beckman Corporation (Pharmaceuticals)

Charles W. Duncan, Jr.
President, Warren-King Companies (Group of Energy-Related Companies)

Hubert Faure
Senior Executive Vice President — Building Systems

T. Mitchell Ford
Chairman, President and Director, Emhart Corporation (Diversified Manufacturer)

Harry J. Gray
Chairman and Chief Executive Officer

Pehr G. Gyllenhammar
Chairman and Chief Executive Officer AB Volvo (Automobiles, Trucks, Buses, Oil Trading and Prospecting)

Robert H. Malott
Chairman of the Board and Chief Executive Officer, FMC Corporation (Machinery and Chemicals)

K. Rupert Murdoch
Chief Executive Officer The News Corporation Limited (International Media Group)

John S. Reed
Vice Chairman Citicorp and Citibank, N.A. (Financial Institution)

William E. Simon
Chairman Wesray Corporation (Private Investments)

Darwin E. Smith
Chairman of the Board and Chief Executive Officer Kimberly-Clark Corporation (Consumer Paper Products)

Richard S. Smith
Vice Chairman and Director National Intergroup, Inc. (Metal Products)

William I. Spencer
Retired President and Director Citicorp and Citibank, N.A. (Financial Institution)

Robert L. Sproull
President University of Rochester

Jacqueline G. Wexler
President National Conference of Christians and Jews

Committees

Executive Committee
Harry J. Gray, *Chairman*
T. Mitchell Ford
Richard S. Smith
William I. Spencer

Audit Review Committee
Richard S. Smith, *Chairman*
Antonia Handler Chayes
Charles W. Duncan, Jr.
Pehr G. Gyllenhammar
Darwin E. Smith
Jacqueline G. Wexler

Committee on Compensation and Organization
T. Mitchell Ford, *Chairman*
Robert F. Dee
Darwin E. Smith
Robert L. Sproull
Jacqueline G. Wexler

Nominating Committee
William I. Spencer, *Chairman*
T. Mitchell Ford
Harry J. Gray
Robert H. Malott
William E. Simon
Darwin E. Smith

Pension Committee
Robert L. Sproull, *Chairman*
Robert F. Dee
Harry J. Gray
William E. Simon
Richard S. Smith
William I. Spencer

Public Issues Review Committee
Jacqueline G. Wexler, *Chairman*
Antonia Handler Chayes
Charles W. Duncan, Jr.
Pehr G. Gyllenhammar
Robert H. Malott
William E. Simon
Robert L. Sproull

Operating and Policy Committee
Harry J. Gray, *Chairman*
Stillman B. Brown
Robert J. Carlson
Raymond D'Argenio
Hubert Faure
Edward W. Large
Latham L. Allison
Clark MacGregor
Sidney F. McKenna
Russell G. Meyerand, Jr.
Francis L. Murphy, *Associate Member*

Officers

Management

Harry J. Gray
*Chairman and
Chief Executive Officer*

Robert J. Carlson
President

Hubert Faure
*Senior Executive Vice President –
Building Systems*

Stillman B. Brown
*Executive Vice President – Finance
and Administration*

Edward W. Large
*Executive Vice President – Legal
and Corporate Affairs*

Richard J. Coar
Senior Vice President – Power Group

Robert F. Daniell
*Senior Vice President – Defense
Systems Group
Chief Executive Officer, Sikorsky
Aircraft*

Raymond D'Argenio
*Senior Vice President –
Communications*

Richard F. Gamble
*Senior Vice President –
Controls Group*

Edward M. Irving
*Senior Vice President – Industrial
Systems Group
Chairman and Chief Executive Officer,
Inmont*

Clark MacGregor
*Senior Vice President – External
Affairs*

Sidney F. McKenna
*Senior Vice President – Human
Resources and Organization*

Francis L. Murphy
*Senior Vice President and Counsel
to the Chairman*

James A. O'Connor
*Group Vice President – Essex Group
Chairman and Chief Executive
Officer, Essex*

Edward J. Rapetti
*Group Vice President – Automotive
Group; President and Chief Executive
Officer, Ambac*

Latham L. Allison
Vice President – Strategic Planning

Joseph A. Biernat
Vice President – Treasurer

J. Thomas Bouchard
Vice President – Industrial Relations

Thomas A. Drohan
Vice President – Public Relations

William J. Evans
Vice President

Beverly C. Lannquist
Vice President – Investor Relations

Martin R. Lewis, Jr.
Vice President and Secretary

Russell G. Meyerand, Jr.
Vice President – Technology

Charles B. Preston
Vice President – Controller

Dale W. Van Winkle
Vice President

Ralph A. Weller
Vice President

Hugh E. Witt
*Vice President – Government
Liaison*

Irving B. Yoskowitz
Vice President and General Counsel

Bill L. Aishman
*President, Pacific Area
Operations, Otis*

Robert F. Allen
*President and Chief Executive
Officer, Carrier*

Anthony D. Autorino
*Chairman and Chief Executive Officer,
United Technologies Building Systems
Company*

Selwyn D. Berson
*Executive Vice President, Pratt &
Whitney Group*

John M. Bruce
*President and Chief Operating Officer,
Essex*

Lawrence W. Clarkson
*President, Commercial Products
Division, Pratt & Whitney Group*

George A. L. David
*President, North American
Operations, Otis*

Leonard L. DeSantis
*President and Chief Operating Officer,
Inmont*

Harold L. Ergott, Jr.
*President and Chief Executive
Officer, Mostek*

Francois Jaulin
*President and Chief Operating
Officer, Otis*

John Lovkay, Jr.
*President, Hamilton Standard
Division*

Frank W. McAbee, Jr.
*President and Chief Operating Officer,
United Technologies Building Systems
Company*

T. Stephen Melvin
*President, Manufacturing Division,
Pratt & Whitney Group*

Irwin Mendelson
*President, Pratt & Whitney
Engineering Division, Pratt &
Whitney Group*

Herman A. Michelson
President, Norden Systems

William C. Missimer, Jr.
*Executive Vice President, Pratt &
Whitney Group*

William F. Paul
*President and Chief Operating Officer,
Sikorsky Aircraft*

Joe R. Phillips
*President, Government Products
Division, Pratt & Whitney Group*

Francisco Ramos
*President, Latin American
Operations, Otis*

William L. Sammons
*President, North American
Operations, Carrier*

Elvie L. Smith
*President and Chief Executive Officer,
Pratt & Whitney Canada Inc.*

Terry D. Stinson
President, Elliott

Jean-Pierre van Rooy
President, Carrier International

Arthur E. Wegner
President, Pratt & Whitney Group

William A. Wilson
*President, European and
Transcontinental Operations, Otis*

Transfer Agent
For the Common Stock and for
the \$2.55 and \$4.50 Preferred
Stocks

Morgan Guaranty
Trust Company of New York
30 West Broadway
New York, New York 10015

Transfer Agent
For the \$8.00 Preferred Stock*

The Chase Manhattan Bank,
N.A.
1 New York Plaza
New York, New York 10081

Registrar
For the Common Stock

The Bank of New York
90 Washington Street
New York, New York 10015

Registrar
For the Preferred Stock

Manufacturers Hanover
Trust Company
90 West 33rd Street
New York, New York 10015

Stock Listing
Common
New York, London, Paris,
Frankfurt, Geneva, Lausanne,
Basle, Zurich, Brussels and
Amsterdam Stock Exchanges
\$8.00 Preferred
New York Stock Exchange
\$2.55 Preferred
New York Stock Exchange

Ticker Symbol
Common UTX
\$8.00 Preferred UTX pr A
\$2.55 Preferred UTX pr D

Newspaper Stock Listing
Common UnTech
\$8.00 Preferred UTch pf 8
\$2.55 Preferred UTch pf 2.55

Corporate Office
United Technologies Building
Hartford, CT 06101
Telephone (203) 728-7000

This annual report is sent to
shareowners in advance of
the proxy statement for the
annual meeting to be held at
11 a.m., April 30, 1984, in
Hartford, Connecticut. The
proxy statement will be sent
to holders of Common Stock,
\$2.55 Preferred Stock and
\$4.50 Preferred Stock on or
about March 16, 1984, at which
time proxies for the meeting
will be requested.

Shareowners may obtain a
copy of the 1983 United
Technologies 10-K report
filed with the Securities and
Exchange Commission
by writing to Martin R.
Lewis, Jr., vice president
and secretary, United
Technologies Corporation,
United Technologies Building,
Hartford, Connecticut 06101.
Shareowners may obtain a
list of United Technologies'
charitable contributions for
1983 by writing to Mr. Lewis
at the above address.

Dividends
Dividends are usually declared
the first month of each
calendar quarter and are
usually paid on the 10th day
of March, June, September
and December.

The dividend disbursing agent
for the Common Stock and
the \$2.55 and \$4.50 Preferred
Stocks is:

Morgan Guaranty Trust
Company of New York
Stock Transfer Department
30 West Broadway
New York, New York 10015

Dividend inquiries:
(212) 587-6469
Transfer inquiries:
(212) 587-6372

The dividend disbursing agent
for the \$8.00 Preferred Stock
is:

The Chase Manhattan Bank,
N.A.
Shareholder Services
1 New York Plaza
New York, New York 10081

Inquiries: (212) 676-3812

Power
Pratt & Whitney
Elliott
Fuel Cell Operations
International Support Systems

Building Systems
Carrier Air Conditioning
Otis Elevator
Essex
Building Systems Company

Defense
Sikorsky
Norden Systems

Industrial
Inmont
Automotive

Controls
Hamilton Standard

Mostek

Research Center

Microelectronics Center

The \$8.00 Preferred Stock
was called for redemption on
April 2, 1984. Notices were
mailed to holders of \$8.00
Preferred Stock on or about
February 2, 1984.



High technology is the common denominator of all we do.